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GENTES HERBARUM

Occasional Papers on the Kinds of Plants

By L. H. Bailey

6. Species of Cucurbita

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140. CUCURBITA TEXANA as grown at Ithaca, New York, from seeds brought from the Guadalupe bottoms in DeWitt County, southern Texas. Observe the uniform lobing of the leaves and find the four upstanding staminate flowers.

ARTICLE 6.
SPECIES OF CUCURBITA.

This Fascicle attempts to account for the species of Cucurbita known to be wild and native in the United States, Mexico, Guatemala, British Honduras. An introductory statement on the confusions that exist in certain genera because of inadequate specimens may forewarn the reader of the insufficiency of the treatment.

Two of the major examples of faulty preserved materials are the palms and the brambles. What has happened in them may depict the deficiencies in many other groups and suggest that reformation is needed in some of our botanical collecting and in consequent herbarium practice.

These assertions are of course not in criticism of persons or of any particular collections or to imply that all collections are poor, but to explain some of the insurmountables to clear taxonomic work, and to emphasize the point that good specimens are more important than theories. We are to conceive of species as living entities having relations to their habitats, requiring for the study of their manifestations all the pertinent evidences that can be assembled, and to understand that the primary laboratory is in the field.

The American brambles afford an humiliating example of my remarks. The biennial nature of their woody growth had been overlooked by collectors until recent years, and only one phase of the plant was commonly preserved; and even this phase is often represented by specimens so fragmentary and so carelessly prepared that no man can undertake seriously to understand them. Moreover, the brambles have been avoided because they are uncomfortable to the collector, and species after species has been passed by in contempt. The result has been the habit of accounting for all the unaccountables by supposing them to be hybrids, even when the assumed parents may not themselves be understood; yet the invoking of hybridity is properly a late or terminal process in careful botany and never a refuge.

Contrasts in dependability of knowledge of a genus are marked between such groups as lend themselves quickly to ordinary collecting, as in Carex where the separation of species has been extensive and exact, and in Vitis where techniques are not yet developed and the genus cannot be worked out from present herbarium materials. Other cases may be contrasted in Viburnum, Œnothera, Viola, which are well in hand, as against Prunus which will remain in doubt until complete methods of collecting are established.

I return to the brambles to enforce my point. Confusion in them has been complete and ridiculous. In the North American blackberries the published hybrids have been more numerous than the species, and not one of the hybrids has been verified even in the testing grounds that are supposed to have elucidated them. More than fifty years ago I began the hybridizing of our native species. I also set one of my careful students, the late F. W. Card, author of the book Bush Fruits, into the work and he took it up with enthusiasm. I still have some of the specimens I made from the crosses. After some years I had learned the primary lesson in such work in its relation to taxonomy of new, ill-defined or dubious species in any group,—that one cannot clarify the species of a genus if one sets out at the start to confuse them.

At the same period I covered a considerable area with brambles transplanted from the wild to see how they might vary. From these behavior studies I learned that one does not usefully study variations of a species until one knows the species; this is a prerequisite to experimental work.

I then threw away my failures and have spent a third of a century in the effort to know the species as they occur in nature. Time has now come when hybridizing, cytological and genetic studies, in relation to the taxonomy of Rubus, should wait until we discover our starting-points and have a scientific foundation. We may then begin to speculate.

Mental attitudes in the treatment of Rubus are worth repeating. At a time when we could not tell one species from another, we have not hesitated to postulate hybrids between them. Our prejudices against the genus have been so compelling that we could not acquire a scientific attitude toward the problem of understanding them. We have persistently collected materials so poor and sketchy that no person can study them. We still admire the old fallacy that one should start with the determination not to make "too many species," which is an inhibition against freedom of research. This obstacle has had much to do with preventing critical work in Rubus. When Blanchard forty years ago ventured to break tradition, his work was disregarded or thrown out. Confusions have been maintained by the fact that American brambles yield many pomological varieties which are left to persons who do not recognize essential differences in species and are unable to distinguish relationships. We have made ourselves elaborate hypotheses on origins before we have learned to distinguish the species, beginning thereby at the wrong end of the problem. Probably most of these taxonomic questions can be elucidated by the simple process of *careful and sustained collecting*.

Perhaps it will be a generation yet before we are mentally ready to discard the taboos on Rubus.

All these remarks apply with particular force to Cucurbita. Here we

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have the sexes separated, big fruits often not preserved, differing foliage on parts of the vine, extensive vegetative growth, tendril characters to be shown, root duration to be determined; yet specimens in herbaria may be the merest scraps and often the leaves not even straightened out so that one may see the shape. Moreover, the label may give no information as to whether the plant was apparently indigenous or only an escape from cultivation.

Probably the best way to begin a clarification of the genus Cucurbita in America is to sort out as many as possible of the confusions in the herbaria and to name such new species as appear, rather than to await the indefinite period when sufficient specimens may be available; perhaps the publication of the species will stimulate the collecting. It is surprising how many clear specific lines are discoverable in the available collections, poor and incomplete as many of them are.

The importance of this present study of Cucurbita may not be at once apparent. One of the major problems before students of plants is to determine the origins of the three great species or groups of pumpkins and squashes, *Cucurbita Pepo*, *C. maxima*, *C. moschata*, all of which are supposed from historical and archeological evidences to be American. We appear to assume that the species have become extinct in the wild, merely on the accident that we have not yet found them. If this Fascicle demonstrates that we have successfully overlooked twelve to fifteen species within our territory, in such big and prominent plants as Cucuribtas after more than one hundred years of collecting, what warrant have we to say that *C. Pepo*, *maxima*, *moschata*, no longer exist as wild plants? Perhaps we should remember that these three species were named and described by Linnæus and Duchesne from plants long in domestication and even then highly modified, and that we have not yet visualized them in what may be their native wild condition. Yet these three are good entities and must be enduring. They do not cross, at least not under ordinary circumstances.

Before we go farther in our discussions let it be said that our only absolute records are specimens in herbaria, however inadequate they may be. They are the materials that enable us to determine species and to be certain of localities or distribution; and unless we know the species all our inquiries are speculative and may be fruitless.

Trouble with some of the collateral work involving citation of species is the fact that authors may not know the meaning of herbarium material or may even be indifferent to it; yet such material is inescapably the primary record and cannot be gainsaid. No longer can we take species for granted. Here may lie a cardinal defect in the training of specialists.

We draw conclusions on origins and nativities from the set of herbarium specimens available to us. The conclusions are published, and on the con-

clusions we base our biological philosophies, quoting the authors confidently. Yet a new set of specimens may lead us to other and perhaps very different conclusions and we may be compelled to qualify our philosophies. All of which means that the more numerous our specimens, the better they are prepared and maintained, the wider the coverage in territory and conditions, the more substantial must be the conclusions if we are careful and patient in our interpretations. I am constantly more cautious about accepting the old conclusions, based as most of them are on inadequate evidences. Age does not prove the conclusions even though it venerates them. Modern cytological and genetical methods should aid us in the interpretations in case we know the species with which we are dealing and have made records of them. We constantly need more materials, as the complexities of investigations multiply. On scant and scrappy collections in any genus we prove nothing. There is little in the collections to aid us to dependable conclusions, for example, on the evolution streams in domesticated Brassicas. Explanations in that group have been too simple to be convincing. But this Fascicle is about Cucurbita, and I return.

In the account of *Cucurbita texana*, just following the Key, I suggest where we may hopefully look for the origin of *C. Pepo*, which perhaps is not a tropical species. All through the tropics I see *Cucurbita moschata* in cultivation and I have taken it outside cultivated areas but apparently as escapes or fugitive plants. Yet one finds pieces of specimens of this species in the herbaria ticketed as if truly from the wild, often under erroneous determinations. Similarly but less frequently one sees specimens of *C. maxima* with tickets and localities as if the plants were thought to be wild and native. Perhaps even now there are specimens enough in the herbaria to settle questions of origin if the labels had been explicit and had made proper records. The problem, after we have defined what we are looking for, is, to repeat, *careful and sustained collecting.*

We can apply all these various remarks to any number of cultivated plants, perhaps even to *Phaseolus vulgaris* and *Zea Mays.*

Backgrounds

Reason for this Fascicle is the author's fascination for the pepo things throughout a lifetime. They are amongst the marvels of the vegetable creation.

I began to grow all the kinds of pumpkins, gourds and squashes I could find as a boy on a farm. From those far days until now every recurring year has seen cucurbitaceous plants growing in my garden. As I write these lines in mid-October, 1943, golden-ripe Indian pumpkins lie with their frosted vines outside my door. Already I have seeds from the Argentine for the year to come, and space is allotted to them. These are rarer satisfactions than to grow only the approved denizens of gardens.

My first definite experiments were begun at the Agricultural College of Michigan in 1887 when crosses for a systematic study were made. Seeds from these crosses were brought with me to Cornell University fifty-five years ago. Acres were covered with the progeny for a number of years, and hundreds of other hand crosses were made under the best practices of the day. A considerable literature developed from this work; its course is recorded in Gentes Herbarum, ii, Fascicle ii, in 1929, where contrasts between the three domestic species were fully drawn and horticultural races were placed. The projects were primarily horticultural, but close consideration of the botanical species entered into all of them.

These extensive tests verified the species lines as laid down so remarkably by A. N. Duchesne (1747–1827) one hundred years earlier. They demonstrated the limits of crossing, disproved the common opinion that all kinds of pumpkins and squashes and cucumbers and melons mix indiscriminately, upset the notion that straight selection is competent to produce new and stable varieties inasmuch as sexes are separate on the plant and individual pollination is seldom if ever fruitful under common conditions, showed definitely that any worth while breeding must clearly recognize the natural species, and proved anew that highly variable domesticated plants are still amenable to botanical study. These problems had, of course, been covered in France by Duchesne, by Charles Naudin (1815–1899), with whom I had the advantage of correspondence, and by many others in this country and abroad. Some of the results were put in taxonomic form by Friedrich Alefeld (Lechdringhausen) in his Landwirthschaftliche Flora, Berlin, 1866, now a scarce book and which is likely to be side-passed by current nomenclatorialists because it does not tally with recent formal practices, even though the author in his prefatory pages has left sufficient explanation to clarify his practice.

My Gentes Fascicle of 1929 (Fasc. ii in Vol. ii) is titled "First Paper." The second paper has not yet been prepared, although Volume II has Fascicle IV containing "Three discussions in Cucurbitaceæ." The intention of Paper II to supplement Paper I can now hardly be carried out, but the present Fascicle indicates that the interest in the pepons is not abated. In fact, in 1937 I published a book titled "The Garden of Gourds"; this I still hope to extend. In all these writings the importance of identification was the primary consideration, and to this end native species of Cucurbita have been grown as well as many pumpkins of the Indians.

More than fifty years ago I proposed the abbreviation "cucurbit" for the cultivated pepo plants, being unmindful of a dictionary history of the word. This name has now become current among American growers and students. Later, Dr. Byron D. Halsted (1852–1919) went one syllable

further and proposed "cucurb," but that word apparently does not have enough substance to give it staying power.

Before we enter on the technical discussion, the reader may be referred to two recent studies of Cucurbita, where, also, other citations may be found: No. 3, Bulletin of Applied Botany, of Genetics and Plant-Breeding, xxiii, Leningrad, 1929–1930, text in Russian with brief conclusions in English; The Cucurbits, in The Vegetables of New York in Report of the New York State Agricultural Experiment Station, Geneva, for the year ending June 30, 1935, botany by the late Glen P. VanEseltine.

CUCURBITA, Linn. Sp. Pl. 1010 (1753).

Annual and perennial scandent herbs with fibrous, tuberculate or tuberous roots, growing parts commonly sappy and more or less succulent, usually monœcious: leaves alternate, palmately ribbed, entire in ambitus or lobed, commonly pilose, pubescent or muriculate: tendrils opposite leaves, sometimes simple or commonly forked, well developed when the plants are active climbers on bushes and trees: flowers large, yellow or yellowish, solitary in axils; calyx and corolla gamosepalous and gamopetalous, the lobing prominent and constituting specific characters; anthers 3, long, connivent into a single conspicuous often somewhat twisted body that discharges abundant pollen when flower expands and that stands within a circular disk; pistil a single ovoid or oblong body, style single, stigmas of three 2-lobed parts, all contained in a circular rim or disk; ovary conspicuously inferior, constricted at top: fruit a pepo, normally with 3 (sometimes with 5) central 2-branched placentæ on which many ovules are placed horizontally or somewhat pendent, the pepo morphologically 3-loculed, sometimes falsely 5-loculed, the entire central mass often breaking away from the walls at maturity and forming a loose fibrous internal ball, the rind or shell in such cases hard and durable; peduncle persistent; flesh of peripheral walls often thick and succulent and highly edible, the seeds being removed with the stringy interior tissue; seeds ovate or ovate-oblong, glabrous when dried at maturity, white or tawny or black, margin often raised, anatropous, embryo near point and remainder of content composed of cotyledons.

Species 10 as treated in the comprehensive monograph of Alfred Cogniaux in 1881 and still the accepted treatment (in DeCandolle Monographiæ Phanerogamarum, vol. iii), all occidental or supposedly so except *C. ficifolia* which is reputed eastern Asian but nativity not demonstrated, the three domesticated species, *C. Pepo, moschata, maxima,* yet unrecognized wild but accounted American; genus now nearly doubled in number; probably the entire genus is original in the western hemisphere. Type species, *C. Pepo,* Linn.

If persons are startled to find nine new and one recently new species added to Cucurbita, making twenty-two all told, let me protect him from another shock in case a Supplement to this paper should appear by stating

that at least five other American species are known to me but are not yet diagnosed for lack of sufficient material.

Three other species names, under Cucurbita, are in the literature as inhabitants of our territory, as follows:

C. ficifolia, Bouché 1837. Black-seeded fruit, cultivated in many parts of the world, supposed to be east Asian but not acknowledged in floras of that region; also suggested as native in the Mexico-Guatemalan region. It is grown in the American tropics, but such specimens as I have seen supposedly from the wild are *C. moschata*. Further publication on this plant may be expected.

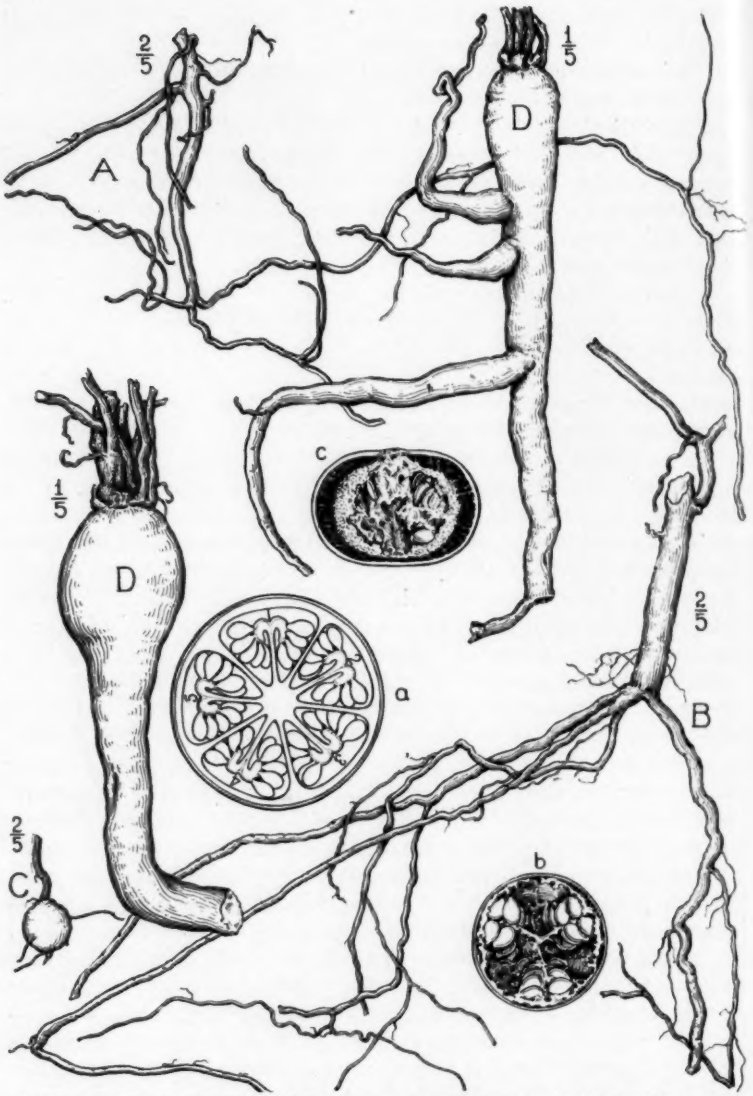
C. mexicana, Damman Catalogue 1890–91, 42; Kew Bull. 1901, append. ii, 40. "Very similar to *C. melanosperma* [*C. ficifolia*] but with leaf of different shape and flower of different hue, seeds large and black." *Nomen incertum.*

C. mixta, Pangalo, in Bull. Applied Bot., Leningrad, 1929–30, suggests forms of the plant we have known as *C. moschata.*

Inasmuch as I have expressed dissatisfaction with some of the herbarium material of Cucurbita the attentive reader may ask what I mean. In the first place, the specimens should be carefully pressed and cured, leaves straightened out, enough material taken to represent the leaf forms on the plant, not confined to a growing tip because it is easily collected and put in press, big leaves as well as small leaves shown; this exuberance may require more than one sheet, and if it covers two or three or even more sheets the student will be safeguarded against error.

Beyond ordinary and decent specimens, the collector should find the root system, get flowers of both sexes, be sure of the tendrils as indicating habit of plant, and save the pepo, with peduncle, or a photograph of it, and a few seeds. The collector should take special pains to indicate locality and whether the plant is probably indigenous, or adventive or fugitive. Much is involved in the future collecting of Cucurbita because of its bearing on the genesis of a great domesticated group.

Pepos preserved in museums soon lose their colors and markings, as do the little gourds we grow in the garden. In autumn and winter one sees hundreds of these wild fruits in fields, all faded to dull yellow or drab. Colors and disposition of them are good marks of identification, yet they do not appear in descriptions. Some of the pictures in this Fascicle, made directly from fresh specimens, suggest the dissimilarities. In my own practice, I bring the pepos home and keep them in boxes or big clasp envelopes that fit the pigeon-hole; but I try to photograph them in the field before they begin to fade. For photographing I do not carry a snapshot camera, but make the exposures accurately from a tripod and with careful focusing. Then one should take special care with the printing so that proper paper



141. ROOTS AND STRUCTURE OF PEPO. A and B, fibrous annual root systems of *Cucurbita okeechobeensis* and *C. sororia* respectively. At C tuberculate root of an undescribed species of Michoacán. D, D roots of *C. palmata;* see Fig. 158. At *a* cross-section of pepo of *C. palmata,* exposing the five placentæ at 1, 2, 3, 4, 5. At *b,* an old dried pepo of *C.*

may be chosen and one does not get a silhouette, or a black-and-white, with detail lost.

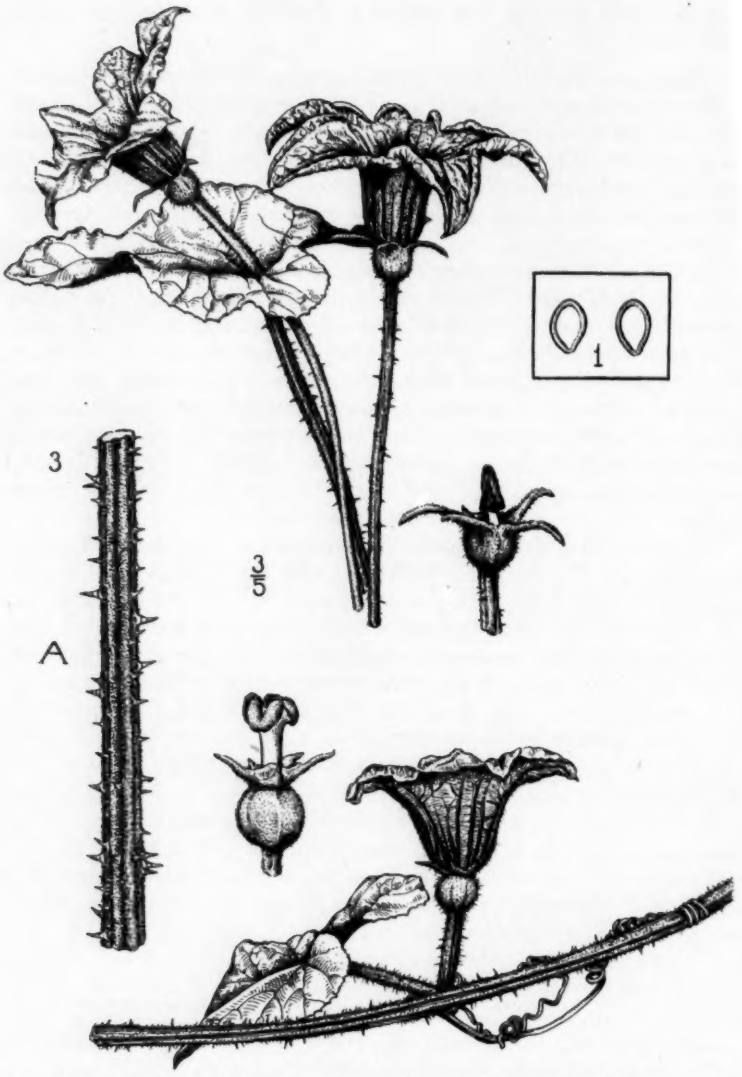
The pepo of Cucurbita is the product of a 3-carpelled ovary, represented in the 3 stigmas, each stigma divided. Its gross morphology is well enough explained for our purpose in Gentes Herbarum ii, Fascicle ii, beginning page 75, where it is illustrated by photographs from domesticated plants. We may now look briefly at the wild native species. Pepos of these species are seen herewith in Figs. 141, 143, 144, 147, 149, 150, 152, 154, 155, 156, 157, 158, 159, 161, 163.

In 1882 C. C. Parry called attention (Bull. Torr. Bot. Club, ix, p. 30, t. xiv) to the fact that in southern California the pepos of *C. fœtidissima* (*perennis*) are "normally 3-celled" while those of *C. digitata* and *C. palmata* are "quite constantly 5-celled"; to the latter group he added *C. californica* the following year (x, p. 50, with plate). He noted that rarely the fruits might be 6-celled, as *C. fœtidissima* may be 4-celled "occasionally in large specimens." The morphology of the 5-celled fruits has not been traced back, apparently, to the ovary and stigmas. I find these internal features to be practically constant in these species although there are some irregularities.

Cross-section of a representative mature pepo of *C. palmata* is shown at *a* in Fig. 141. The five locular divisions are seen running out from the center to the periphery, 1, 2, 3, 4, 5. Between them are the five placentæ, lobed and recurved at the top and with the many seeds attached. In time as the pepo becomes dessicated much of the tissue disappears and the structure is less evident. At *b* in Fig. 141 one sees an old dessicated fruit of *C. texana;* the locules are three; the placentæ have disappeared, and the old locular tissue remains, the seeds being separated from their placental attachments and therefore appearing to be attached at the broad end (to the divisional or locular bundles). At *c* one sees part of the shell or rind broken away and the dessicated central fibrous mass still anchored to the periphery by threads; soon these threads will lose their hold and the ball will be free and moveable inside its globe. One may trace the tripartite structure of fresh pepos of *C. fœtidissima* in Fig. 163, the parted parietal columns at v, v, v in the cross-section.

Roots in Cucurbita species appear not to have been studied. The three classes, here first designated, are seen in Fig. 141. At *A* and *B* are fibrous annual roots, *C. okeechobeensis* and *C. sororia* respectively; note also Fig. 152. At *C* is a tuberculate root, this picture representing an undescribed species from Michoacán; other tuberculate species are seen in Figs. 147, 148. The varying deep woody perennial root of *C. palmata* is shown at *D*

texana with the placentæ disappeared and the three carpellary walls remaining. At *c* an old fruit of *C. texana* in longitudinal section, the dry fibrous contents broken away from the shell except only at the top. For fuller explanation, see page 275.



142. CUCURBITA TEXANA. Staminate flowers above, one of them stripped of the corolla. Pistillate flowers below, one of them stripped. Seeds in box. At A a bit of petiole enlarged to show the spicules.

and *D*, as well as in Fig. 158; other deep tuberous roots are shown in Figs. 161, 162.

Many persons and institutions have made this Fascicle possible by collecting materials, loaning me specimens, giving me access to their museums: my friend and correspondent, Maximino Martinez of Mexico City; H. J. Webber, Riverside, California; C. B. Wolf of Anaheim, California, and the Rancho Santa Ana Botanical Garden; M. VanRensselaer, Santa Barbara and the Botanical Garden there; E. M. Harvey, Pomona, California; French Gilman, Banning, California; Mrs. W. Egbert Schenck, Twentynine Palms, California; Herbarium of Pomona College, California; Herbarium of Natural History Museum, San Diego; Dudley Herbarium, Stanford University; Forrest Shreve and Shreve Herbarium, Tucson, Arizona; R. G. Reeves, College Station, Texas; V. J. Shiner, El Paso, Texas; Herbaria of Missouri Botanical Garden, Field Museum of Natural History, Gray Herbarium, New York Botanical Garden, National Herbarium. Drawings are by Florence Mekeel, always from actual materials or original photographs.

Key to the eighteen Cucurbitas

A. Division I. *Cucurbitæ emuriculatæ*. Investiture, if any, of petioles, leaves, peduncles, axes pilose, pubescent or spiculate: leaves thin and green, various in shape and lobing but not narrow-triangular in ambitus nor stiff, soon wilting and collapsing when collected: tendrils slender, mostly long-spiral and the plant usually climbing on bushes and trees: annual and perennial: moist or probably not arid locations.

B. Petioles, peduncles, young axes, one or all, bearing sharp pungent aculeiform translucent spicules, often harsh to the hand, in the manner of *Cucurbita Pepo* (A, Fig. 142), as well as hairs or pubescence: peduncle expanded and ridged at attachment to pepo (*C. fraterna* unknown): probably all annual.—*Spiculatæ*.

C. Axes (stems) as well as petioles and peduncles well beset with spiculæ: leaves large, not lobed much if at all below the middle, apices acute or essentially so.

D. Leaf-blades prevailingly prominently 5-lobed, sinuses narrow and broad lobes usually overlapping; petioles scantily pubescent and hardly pilose: pepo with definite light colored stripes marking carpels or placentæ. Texas.....1. *C. texana*

DD. Leaf-blades indefinitely shallowly 3-lobed near the top, with mostly open or acute sinuses; petioles conspicuously pilose among the spiculæ: pepo with only broken stripes or association of spots. Guerrero, Oaxaca.....2. *C. sororia*

CC. Axes only scantily if at all spiculate: leaves small, 3-lobed much below the middle and lobes prominently obtuse even if sometimes mucronate. Tamaulipas.....3. *C. fraterna*

BB. Petioles, peduncles, axes not bearing pungent translucent spiculæ, or at most only now and then, the investiture (if any) noticeably in the form of hairs or pubescence: plant annual or perennial.

C. Leaf-blade on the whole approximately entire or not lobed (aside from margins) but sometimes angled or cornered, or at least without large rounded sinuses.

D. Plant making many very slender naked stems that lie on ground and take root at nodes: leaves softly gray-pubescent underneath, on upper surface short-hairy but not papillate: root tuberculiferous. Near Mexico City.....4. *C. radicans*

DD. Plant otherwise; stems of usual size and diameter, not conspicuously rooting at nodes, very leafy: peduncles expanded and ridged.

E. Under surface of leaves finely pubescent between the veins; petiole finely pubescent: pepo showing a few main stripes, the rind thin and not unusually resisting. Florida.....5. *C. okeechobeensis*

EE. Under surface of leaves not pubescent between veins, but usually marked by papulæ or points (or sometimes also with a very few short stiff appressed hairs); petiole not pubescent: pepo not striped, the rind thick and very hard and difficult to the knife. Vera Cruz.....6. *C. Martinezii*

CC. Leaf-blade prominently lobed to one-third or more its depth, with narrow and more or less rounded sinuses, the lobes (or at least the upper ones) ascending.

D. Leaves very narrowly 5-lobed nearly or quite to base and pedate, lobes obtuse even if mucronate. Quaretaro.....7. *C. pedatifolia*

DD. Leaves not very narrowly 5-lobed or pedate.

E. Blade of leaf hairy, angular in ambitus, strongly narrow-cordate at base, with two overlapped sinuses at or above middle, angles or corners acute or nearly so, both surfaces minutely papulose: corolla very strongly costate: produces a small globose subterranean tuber. Mexico, D. F.....4. *C. radicans* var.

EE. Blade not angular or cornered, not conspicuously hairy, openly or very broadly cordate at base (unless in *C. gracilior*), provided with one or two obtuse although mucronate lateral lobes, most of the sinuses extending nearly to the middle or below.

F. Width of leaf-blade equalling or exceeding length; upper lobe or apex very broad; upper surface of leaf soft or at least not markedly scabrid.

G. Petiole loosely pilose; margin of blade commonly prominently serrate-dentate: annual. Campeche, Guatemala, British Honduras.....8. *C. Lundelliana*

GG. Petiole not pilose although perhaps pubescent; margin indifferently if at all serrate-dentate: duration unknown. Sinaloa.....9. *C. Palmeri*

FF. Width of leaf-blade less than length, terminal lobe narrow and projecting; upper surface of leaf very scabrid: root a large long tuber. State of Mexico.....10. *C. gracilior*

AA. DIVISION II. *Cucurbitæ muriculatæ* vel *asperatæ* (petioli . . . muricato-asperi, HBK. in diagnosis of *C. fœtidissima*). Investiture usually prominent and dense, petioles, peduncles, axes, leaves bearing prickets on veins and angles, as well as hairs and pubescence, being stout even though short stiff often retrorse persisting muricules usually with a thick or bullate base of the kind one often sees in Boraginaceæ (A, Fig. 162): tendrils usually short, the branches often coiling on themselves into a head and the plant mostly confined nearly or quite to the ground: leaves thick and coriaceous, not at once collapsing when cut: stiff harsh gray

plants, persistently perennial as far as known, prevailingly in dry, semi-arid and arid regions. (*C. Galeottii* not sufficiently known to place accurately).

BB. Leaves about as broad as long, not very large, palmately lobed, the lobes (except the terminal one) divaricate.

C. Lobes broad, extending about one-third depth of blade, margins coarsely toothed or lobulate. Baja California.....11. *C. cordata*

CC. Lobes narrow, extending to middle or base of blade.

D. Leaf-blade pedate, lobes very narrow and obtuse and bluntly lobulate along the sides: calyx-tube of staminate flowers long and cylindric. Baja California.....12. *C. cylindrata*

DD. Leaf-blade not pedate, lobes extending to an acute apex.

E. Lobing of leaf very narrow, lobes extending nearly to base of blade, lanceolate to almost linear, acute or mucronulate, undulate or notched along the sides, 3–15 mm. broad: tube of staminate calyx long and cylindric: pepo usually higher than broad, the 10 light stripes narrow and definite; peduncle thin, 9 cm. or less thick at attachment, only slightly angled. New Mexico, Arizona, southeastern California, Sonora.....13. *C. digitata*

EE. Lobing not extending to base of blade and not prolonged, the terminal one 2 cm. or more broad, not notched: tube of staminate calyx trumpet-shaped and broadest at top: pepo usually as broad as long and often broader, stripes broad and often indefinite; peduncle enlarged toward attachment and 14–16 mm. thick and strongly sulcate.

F. Upper 3 lobes of leaf lanceolate-acuminate, twice or more longer than broad, acute and cuspidate, under surface papillate between the veins, base of leaf mostly not cordate or only openly so. Arizona, southern California, Baja California.....14. *C. palmata*

FF. Upper 3 lobes triangular-acutish or almost obtuse, mucronulate, mostly less than twice as long as broad, under surface setaceous-hairy as well as papillate between veins and the leaf grayer, base of leaf more uniformly cordate. Arizona, California, Baja California.....15. *C. californica*

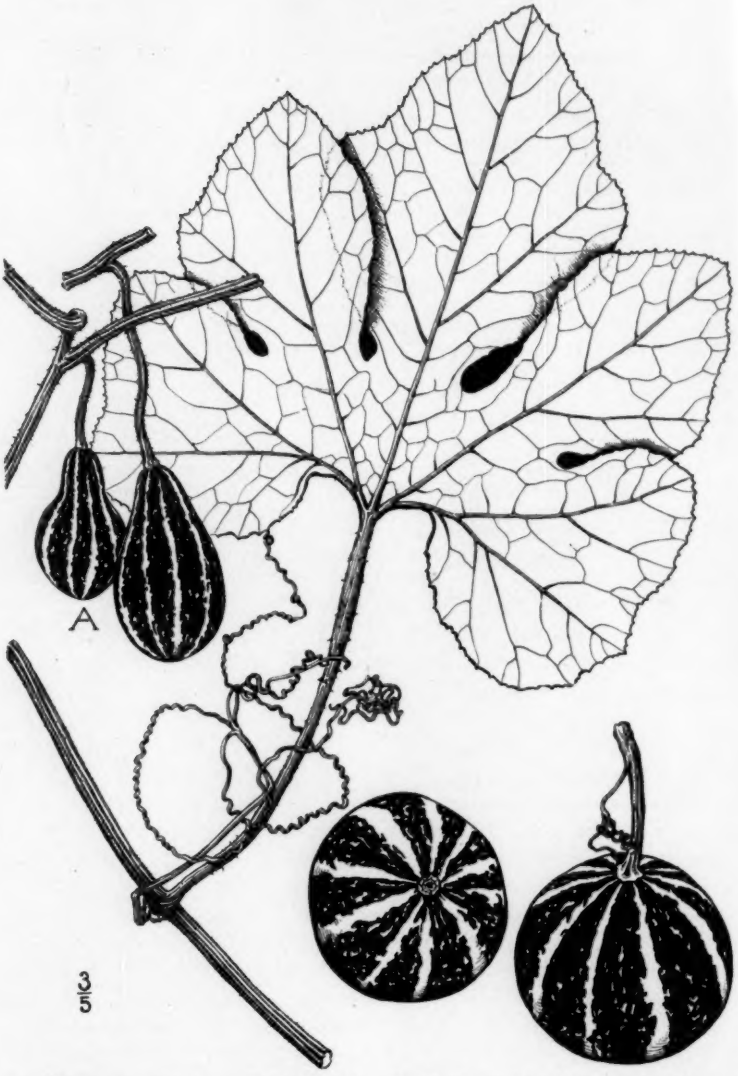
BB. Leaves much longer than broad, large, more or less triangular in outline, lobes (if any) strongly ascending.

C. Foliage thin, green; blade sharply serrate, short-lobed at middle or above, sinuses shallow and acute: tube of staminate calyx acute at base, the lobes subulate and longer than tube. Oaxaca. 16. *C. Galeottii*

CC. Foliage thick, stiff, gray, more or less fleshy: tube of staminate calyx mostly broad or rounded at base, the lobes linear or broader and usually not much if any exceeding tube (exceptions in No. 18).

D. Blade of leaf prominently 2-lobed on either side, lobes obtuse (even if apiculate) and not long-acuminate, sinuses open and obtuse, base subtruncate. Tamaulipas.....17. *C. scabridifolia*

DD. Blade of leaf not regularly lobed although frequently angled or cornered, base commonly cordate but likely to be various, if lobed then acutely so: plant usually strong-smelling, very large and persisting. Nebraska to Texas to California to central Mexico.....18. *C. fœtidissima*



143. CUCURBITA TEXANA, under cultivation directly from the wild. Common form of pepo at lower right, frequent form at A. Note the long spiralled tendril branches.

1. **Cucurbita texana,** Gray, in Boston Journ. Nat. Hist. vi, 193 (1850). Figs. 140, 141, 142, 143.

Tristemon texanum, Scheele, in Linnaea, xxi, 586 (1848); xxii, 352; based on collection by Lindheimer.

Scandent annual, long-climbing over bushes and in trees; slender angled stems loosely pilose and bearing scattered colorless sharp-pointed broad-based spicules 1–2 mm. long: tendrils mostly slender, freely spiralled, sometimes 10 cm. long, branches commonly about 4 but sometimes 3 or 2, or even 5 or 7: leaves thin, soon collapsing when cut and becoming fragile in the press, broadly ovate-pyramidal in ambitus, blade 12–14 cm. by 15–16 cm. but much smaller on newer parts, prevailingly 5-lobed nearly or quite to middle but hardly below, obtuse sinuses closed, in some cases a few of the leaves only angled, margins denticulate, base broadly openly cordate, upper surface scabrid with short stiffish hairs, under surface bearing rough elevated points; petiole sparsely pilose and spiculate: staminate flowers long-pedicelled, campanulate, 7–8 cm. long, light yellow, corolla lightly pilose, strongly veined, lobes acute and cuspidate; calyx-tube pilose, lobes narrow to almost setaceous, equalling or exceeding the tube; pistillate flowers usually shorter than the staminate and perhaps broader, ovary and calyx-tube hairy-pubescent, calyx-lobes very narrow: pepo various in shape and size, commonly oblate and about 6 cm. in transverse diameter, varying to ovoid and pyriform, 3-loculed, at first bright green with 10 broad light colored carpellary stripes of unequal width and many small mottles between; peduncle slender, 4–5 cm. long, sulcate, somewhat expanded at attachment; seeds ovate, 9–10 mm. long when dry, 5–7 mm. broad, with a slightly raised rim, not turgid.

Central and southern Texas, low lands and flood plains along streams: San Fernando River, *Berlandier* in Gray Herbarium; New Braunfels, Comal County, *Lindheimer 820,* collected 1849–51; near Austin, Travis County, *Tharp,* also *Erwin,* Iowa State Coll. Journ. Sci. xii, 253 (1938); Cuero, DeWitt County, *Bailey*; Menard in Menard County, *Cory 24726;* near Laguna, Kinney County, *Cory.* Scheele's Tristemon was based on Lindheimer collections along the Guadalupe River in Texas. "A little known but useful vine. It is definitely a miniature pumpkin. It is found native throughout central Texas where it grows along water courses and its vines climb to the tops of the tallest trees. It bears definite pumpkins which are about two and one-half inches in diameter. As this vine can withstand heat, where a quick cover is needed for a trellis or to provide shade, this plant is excellent."—H. B. Parks in Valuable Plants Native to Texas, 134 (Bull. No. 551, Tex. Agr. Exp. Sta.).

In October, 1929, fresh from collecting *Cucurbita okeechobeensis* in southern Florida, I went across the country to the tangled bottom lands of the Guadalupe River near Cuero, DeWitt County, southern Texas, for the particular purpose of seeing *C. texana,* under the efficient guidance there of Professor B. C. Tharp. The high climbing of the vine is illustrated by an

incident. Pistillate flowers were out of reach of the camera. I saw one flower at a lower level, not quite perfect in shape, and had set up my camera to photograph it. The camera stand was a perfect metal contrivance that had been with me in many unrecordable journeys, but as I was at the point of making the exposure the tripod "went to pieces all at once" like The Wonderful One-Hoss Shay, smashed up by the violent force of gravity. I suppose the remains still lie in the bush. I built a high pile of stones for a camera rest, and the picture is on the right in Fig. 95, Gentes Herbarum, ii, 177 (1930).

The attractive oblate fruits were photographed while still fresh and colorful, and an engraving appeared in Farm and Ranch, Dallas, Texas, January 11, 1930, apparently the first published picture of the fruit of *C. texana;* the same photograph appeared also in the Gentes Herbarum, just quoted; and from this early photograph the drawing was made at the lower right in Fig. 143 herewith. From these fruits seeds were planted at Ithaca, with the beautiful result seen in Fig. 140. I have grown it from other sources also. Not all the fruits have resembled the parents in shape, as attested at the upper left in Fig. 143, where a pyriform progeny is shown. I have seen similar and other variation in fruits from the wild.

When Asa Gray in 1850 transferred the specific name *texana* to Cucurbita from Scheele's genus Tristemon he questioned whether the plant might not be a variety of Linnæus' *Cucurbita ovifera* (Mantissa i, 126, 1767), perhaps naturalized in Texas. In 1891 John M. Coulter supposed the plant to be a "naturalized variety" of *C. Pepo* in his Botany of Western Texas. Before this date, however, 1881, Alfred Cogniaux had included it without differentiation in *C. Pepo,* in his great monograph of the Cucurbitaceæ (in DeCandolle's Monographiæ Phanerogamarum, vol. iii). In 1930 I had come to the conclusion that "it is probably an indigenous plant" (Gent. Herb. ii, 175), and this is now the accepted understanding; it falls in well with the natural history of the North American Cucurbits, as developed in this paper.

Linnæus did not know the origins or nativities of *C. Pepo* and *C. ovifera,* although he assigned a geography to one of them. They were even then old garden residents.

Question of nativity is one thing, and of nomenclature is another. Alefeld as early as 1866 had published *C. ovifera,* Linn. as *Cucurbita Pepo* var. *ovifera* (Dr. Friedrich Alefeld, Landwirthschaftliche Flora, 224), and I have been inclined to include *C. texana* in that category, as has A. T. Erwin of the Iowa State College. The *ovifera* plant of Linnæus is held to include all the common yellow-flowered garden gourds, with the assumption that the field pumpkin, summer crookneck squashes and the like belong to the same botanical species. It is assumable that the great pumpkins never

144. CUCURBITA SORORIA, native in Guerrero and Oaxaca. Seeds in the box. One of the spiculate annual species. See Fig. 141.

145. Cucurbita fraterna, native in Tamaulipas. Root and pistillate flowers unknown. Scarcely spiculate.

existed originally in nature but that they were developed through centuries of domestication by the pre-Spanish inhabitants of America. There is abundant archeological evidence that these inhabitants used and supposedly grew these edible fruits. Those persons who have grown the races of *Cucurbita Pepo* extensively are well aware of all kinds of gradations in pepos between the little garden gourds and the field pumpkins, and are ready to believe that the big ones have developed from the same species as the little ones. We have noted that the pepos of *C. texana* vary greatly in nature. There is no such uniformity in fruit character, as, for example, in *C. okeechobeensis*, *C. digitata*, and others. I think it is possible for the big oleraceous things we know as *Cucurbita Pepo* to have developed from a plant much like *C. texana*.

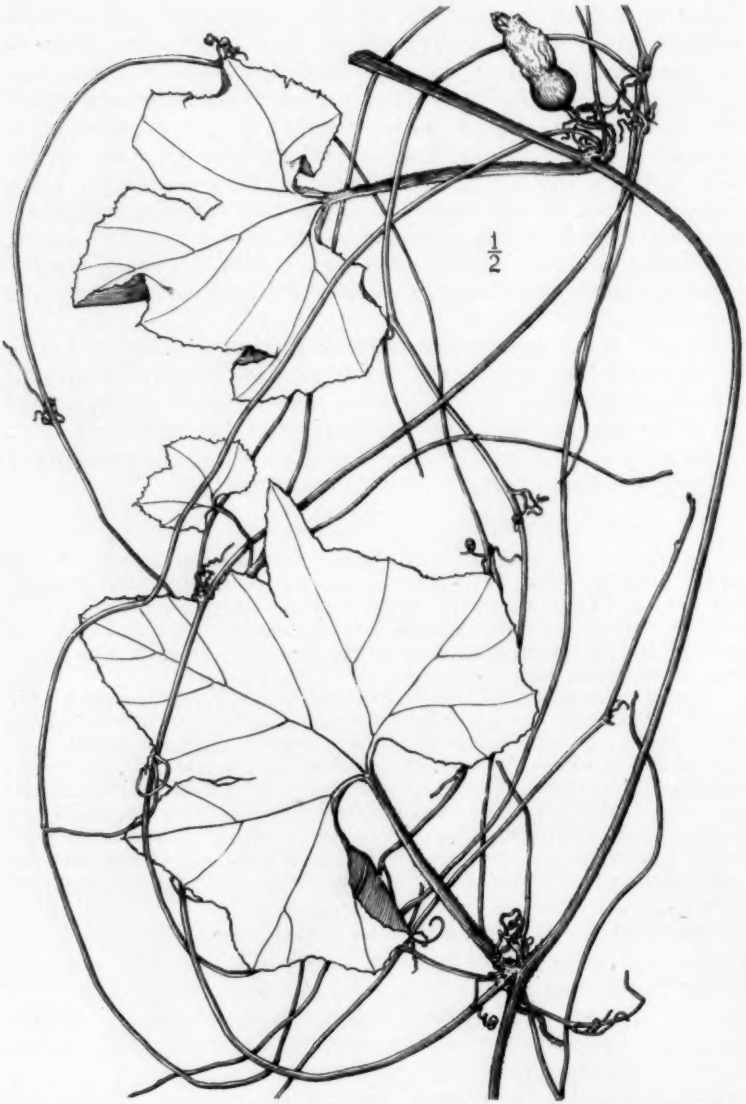
In view of the fact that the connection between *C. ovifera* and *C. texana* has not been demonstrated in practice, I prefer in my time to keep the two things separate in nomenclature, that we may the easier analyze our discussions. Botanically one can find certain differences between *C. texana* and *C. ovifera*, but the dissimilarities are of minor importance and are no greater than I find in races of *C. ovifera* itself.

†2. **Cucurbita sororia,** spec. nov. Figs. 141, 144.

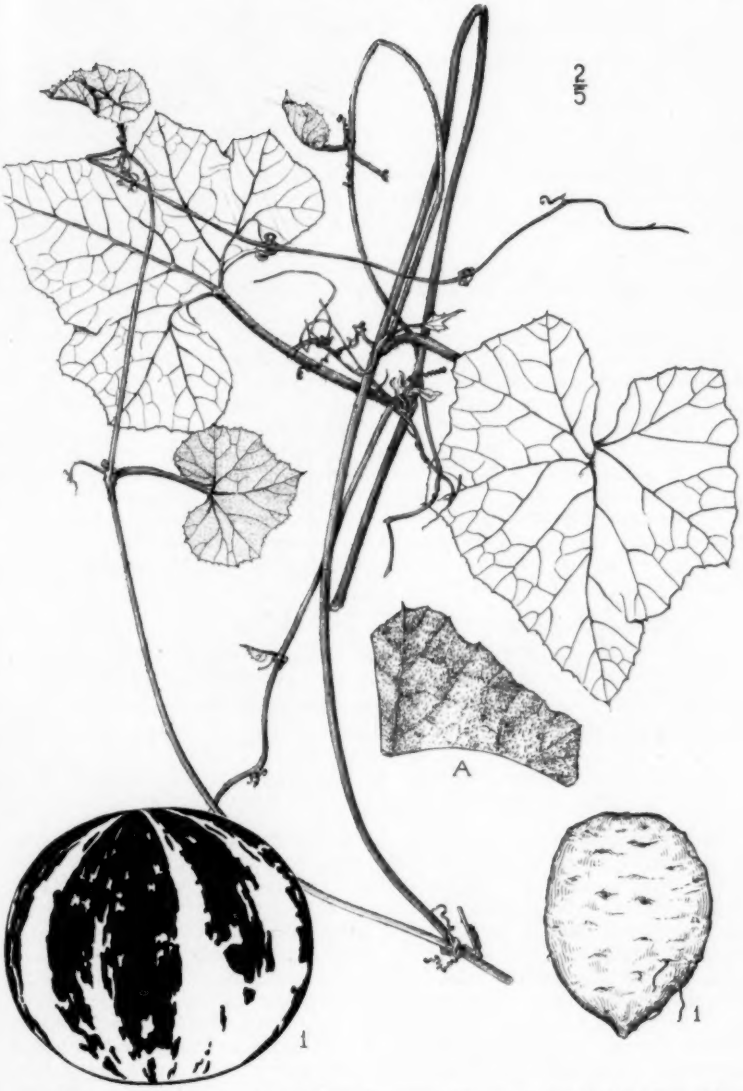
Annua, scandens: cirrhi 3 vel pluribus tenuibus ramis: a *C. texana* differt: foliis fere 3-lobatis vel tantum angulatis, petiolis et axibus juvenilibus strigoso-pilosis sed etiam pubescentibus et spiculatis, folio subter scabrido, calyce et corolla hirsutioribus, pepone longiore quam lato, fere sine definitis lineis carpellaribus sed grosse maculoso, seminibus angustioribus, 9 mm. longis, 4–5 mm. latis.

Strong climbing annual, much like *C. texana*, but leaves commonly only 3-lobed or sometimes only strongly 3–5-angled, petioles prominently beset with strigose light colored hairs as well as pubescent underneath, under surface of leaf more scabrid to the finger from the presence of many small spiculæ, stems terete or less ridged and more closely spiculate, corolla and calyx more hairy, pepo at least mostly longer than broad or not oblate and lacking very definite carpellary stripes but provided instead with larger mottled markings more or less in longitudinal rows, seeds much narrower being about 9 mm. long and only 4–5 mm. broad, the marginal ridge very narrow.

Southern Mexico, in Guerrero and Oaxaca. Gourds collected by me early in 1940, photographed in the field, and plants grown from seeds that year at Ithaca, New York; Coyuca 27–30 kilometers north of Acapulco in wild country near sea level, *Bailey 505*, *510* (type); in remote mountains, region of Tetutepec in southwestern part of Oaxaca, *Bailey 602*. Vines and leaves were dead and gone when I collected the fruits hanging in bushes on dry stems in March, no roots to be found; natives told me the plants come up with the rains in April and gourds are ripe in November. The species is sister (*soror*) to *C. texana*.



146. CUCURBITA RADICANS, drawn from the type specimen in Muséum National d'Histoire Naturelle, Paris, Bourgeau No. 788, collected in 1865-6. Note the length of slender naked strands as compared with the leafage. Region of Mexico City.



147. CUCURBITA RADICANS, drawn from Bourgeau No. 1610 (1865–6) in Gray Herbarium, Harvard University, together with pepo and root tubercle recently collected near Mexico City by Maximino Martinez. Gray-pubescent under surface of thin leaf suggested at A.

†3. **Cucurbita fraterna,** spec. nov. Fig. 145.

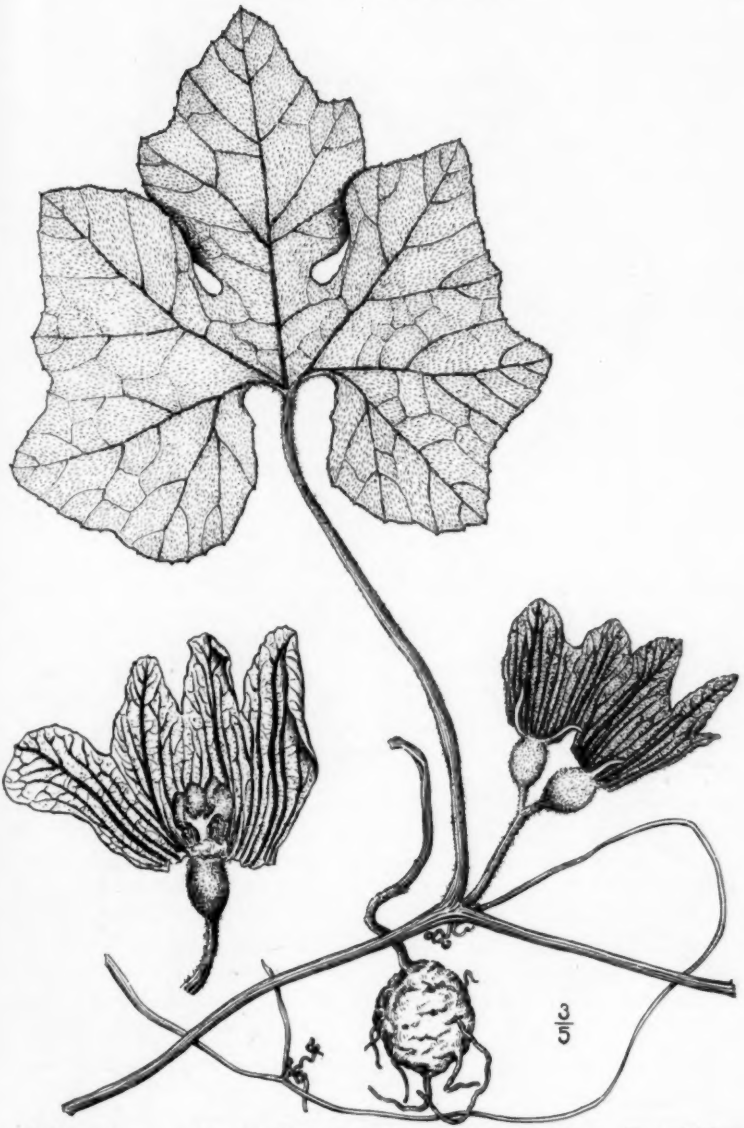
Planta cinerea, radicans, internodi breves, folia parva: cirrhi breves, rami 2–4; axis gracilis, angulatus, brevi-hirsutus, interdum spiculatus: folia late cordato-ovata, 8–9 cm. longa, 7–8 cm. lata, trifida sub medio in angusto-obtusos non imbricatos lobos, sinus angusti obtusique, laterales divisiones fere duplo-lobatæ, margines conspicue denticulati, superficies papillatæ et brevi-pilosæ; petiolus fere multis spiculis: flores staminati angusto-campanulati, 7–8 cm. longi; lobi corollæ latissimi, mucronati apice; calyx parvus, tubus 10–14 mm. longus, lobi lineares, divaricati, 7–9 mm. longi.

Vine with short internodes, grayish in aspect, sometimes rooting, duration unknown: tendrils small and weak, 2–4-branched; stems slender, angled, sparsely short-hairy, sometimes with a few short spiculæ: leaves small, broadly cordate-ovate in ambitus, 8–9 cm. long and nearly as broad, lobed below the middle into 3 main narrow lobes and the lateral lobes again shallowly lobed, lobes all narrow and apex essentially obtuse even if apiculate, main sinuses narrow, rounded at base, lobes little if at all overlapping, basal sinus very broad and open, margins prominently denticulate, upper surface papillose and with sparse short appressed hairs, under surface minutely papillose or dotted and short-hairy on nerves and veins, both surfaces of similar color; petiole stout, striate, short-pilose and bearing relatively few or scattered spiculæ: staminate flowers trumpet-shaped or narrow-campanulate, 7–8 cm. long, corolla-lobes very broad and mucronate at tip; calyx small, tube 10–14 mm. long, lobes linear and spreading and less than 1 cm. long.

Tamaulipas, northeastern Mexico, on Mesa de Llera, *Lundell 7289* (Herb. Univ. Mich.). Brother (*frater*) to *C. texana*, distinguished by smaller more narrowly and more deeply lobed leaves, lobes essentially obtuse and not overlapping, petioles and other parts less spiculate, leaf surfaces less hairy and much more papillate; perhaps not a high climber.

4. **Cucurbita radicans,** Naudin, in Ann. Sci. Nat. Bot. ser. v, vi, 8 (Paris 1866). Figs. 146, 147.

Slender and long-running on the ground, perennial by tubercles 3–4 cm. long; plant to 10 m., lightly hirsute but not spiculate, making many very thin more or less leafless terete stems that root freely at the nodes: tendrils very short with few branches and apparently not prominently functioning: leaves cordate-ovate or broader than ovate, 8–18 cm. long and nearly or quite as broad, apex triangular and more or less pointed, thinly short-pilose and scabrid with whitish points on upper surface, cinereously soft-pubescent underneath, more or less 5-lobed but sinuses not deep, side-lobes sometimes lobed again, margins sinuate-denticulate with brief cusps at end of veins, main ribs 3; petiole equalling or exceeding the blade and somewhat pilose: calyx of staminate flower campanulate, with short narrowly subulate lobes or teeth: pepo oblate-globose, about 4 cm. high and 4.5 cm. broad, glossy and handsome, bright dark green with about 7 irregular and splashed stripes of greenish-white and intermediate dots and flakes of same; seeds oval, 7–8 mm. long, whitish (teste Naudin).



148. CUCURBITA near Mexico City, probably a variant of *C. radicans*. Two pistillate flowers split open, one at left exposing the interior, and at right exterior of ovary and corolla. Note the root tubercle.

149. CUCURBITA OKEECHOBEENSIS of the Everglades in southern Florida. Two staminate flowers. The long spiralling tendril indicates a vigorous climber. See also Fig. 141.

Mexico, in mountains near Guadalupe, region of Mexico City, Valley of Cordova, according to Naudin, collected by E. Bourgeau on the 28th of August, 1865; grown in Paris; Tepepan, near Xochimilco, south of Mexico City, *Maximino Martinez.*

This species is not yet understood. It has been the habit to refer all dubious southern Mexican Cucurbitas to it, inasmuch as there was no alternative. My description herewith is drawn from Naudin's original account and from a photograph of the type, number 788, in Paris (Fig. 146), supplemented by a sheet of Bourgeau's collection, number 1610, in the Gray Herbarium (Fig. 147), with fruit collected in 1943 by Martinez. Both these numbers are cited by Cogniaux in his monograph of Cucurbitaceæ in 1881. Cogniaux also cites specimens of other collectors, which I have not seen. Examination of these materials must await reestablishment of international relations.

The only material subsequent to the original collection I have seen was sent me recently by Professor Maximino Martinez, together with a tuber and a fruit that are recorded in Fig. 147. The fruit was small and attractive, apparently mature, seeds very few and not developed. Fig. 146 is a reproduction of the photograph of the type specimen; it leaves much to be desired for good definition.

Naudin states that Bourgeau notes the plant as perennial but that in cultivation it was annual and showed little tendency to produce fleshy and persistent roots; perhaps the perennial character would not appear in the short season of Paris. On his ticket, 788, Bourgeau speaks of the plant as bearing tubercles: "Cucurbitaceé que j'ai envoyé le fruit et le tubercle à Paris." Therefore I assume that the plant is tuberculate, and not with a heavy fleshy root; the Martinez collection verifies this assumption.

I have a broken seed from the material sent by Bourgeau to Paris; it is ovate and 12 mm. long, whereas the original account calls for an oval seed 7–8 mm. long. Cogniaux describes the seed as ovate-oblong, 8–10 mm. long and 4–5 mm. wide, which is much narrower than my seed. Perhaps Bourgeau sent home more than one thing.

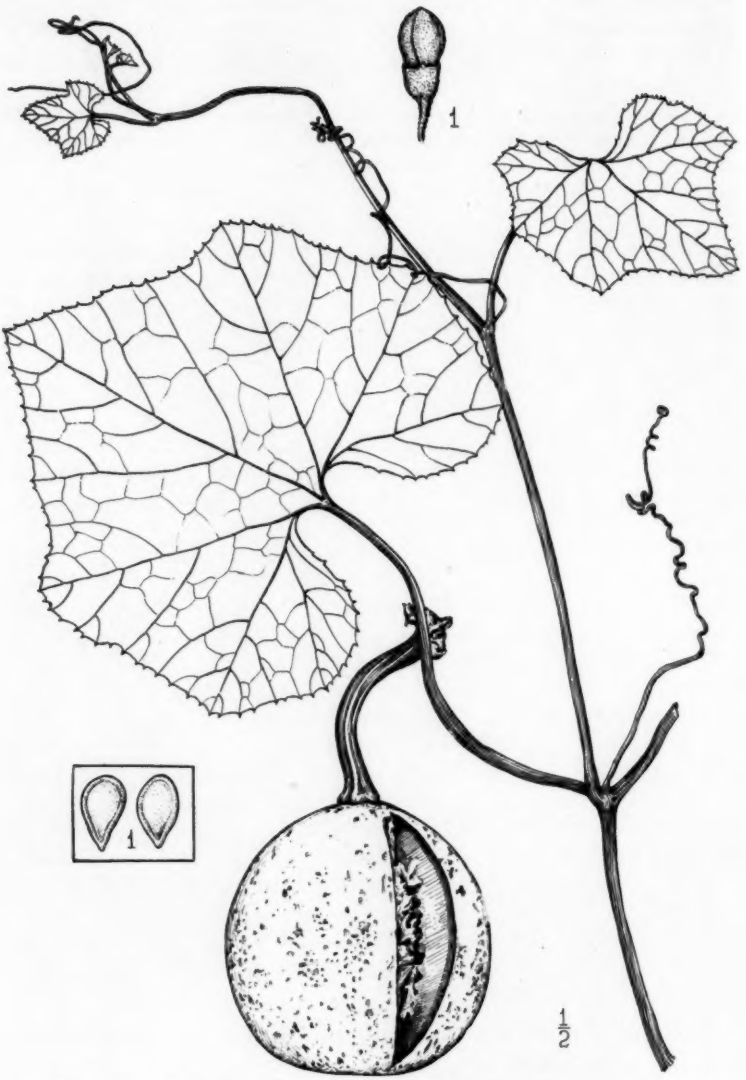
All this indicates that we yet have much to learn about *Cucurbita radicans.*

From Tepepan, near Xochimilco, Federal District, Martinez sends me a tuberculate plant shown in Fig. 148, with lobed leaves but which I take to be *C. radicans,* and, if it is, then we may suppose the species to be variable, at least in foliage.

5. **Cucurbita okeechobeensis,** Bailey, Gent. Herb. ii, 179 (October 8, 1930). Figs. 141, 149.

Pepo okeechobeensis, Small, in Journ. N. Y. Bot. Gard. xxxi, 12 (January, 1930).

High-climbing thin-leaved slender annual vine bearing usually long



150. CUCURBITA MARTINEZII, state of Vera Cruz. Pepo with very hard shell, requiring a saw to cut it evenly. At top, a flower-bud natural size.

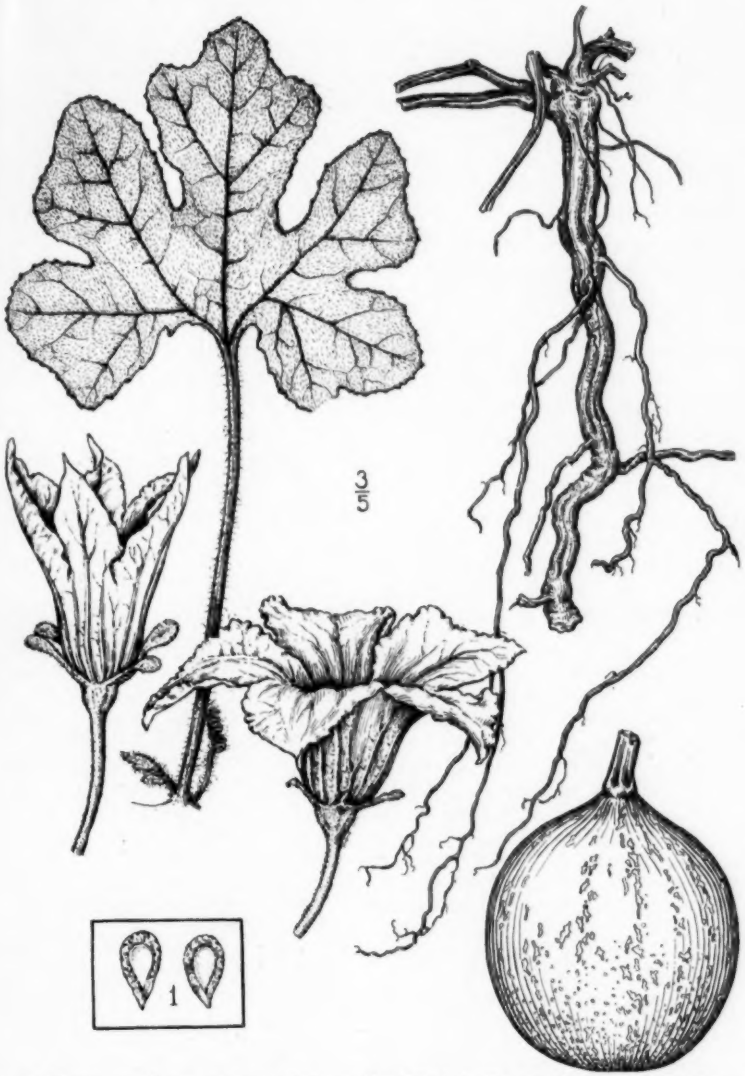
spiralling simple or 3–4-branched tendrils; young growths pubescent-hirsute but becoming nearly or quite glabrous in age, all parts lacking the spiculate investiture of *C. Pepo* and *C. texana:* leaves grape-like, green, cordate-ovate to nearly reniform, 12–20 cm. broad and perhaps not quite as long, strongly about 5-angled or -cornered but not really lobed, apex short-triangular, basal sinus usually deep and narrow, margins bearing mucronate teeth at end of nerves, upper surface bearing few short hairs and presenting shades of green, under surface thinly pubescent; petiole mostly long and hairy-pubescent to nearly glabrous in age: flowers cream-colored to nearly white, broadly campanulate, somewhat hairy on outside, calyx-lobes very short and small in both sexes; staminate corolla about 6 cm. long, lobes acute and curving: pepo 7–8 cm. long and nearly or quite as broad, globular to oblong-globular, green but fading to dull greenish, sometimes marked with very few carpellary lines but not mottled although perhaps indefinitely flecked, 3-loculed, shell thin but very hard, interior soft and juicy at first, flesh almost white and bitter, peduncle enlarging at attachment, angled; seeds firmly involved in dried flesh, ovate and pointed, 11–12 mm. long, 6–7 mm. broad.

Moist or wet places, eastern side of Lake Okeechobee in southern Florida, now restricted in range and probably subject to extinction, luxuriantly covering bushes and climbing in trees.

My good friend, the late John K. Small, in his arduous collecting in southern Florida, was interested in this plant more than twenty-five years ago and he published on it in 1922 in Journal of the New York Botanical Garden (xxiii, 19–23). At that time, however, he confused the plant with the Seminole pumpkin, grown by the Indians on the islands or hammocks in the Everglades. In our collecting together in southern Florida he told me of his intention to describe the plant as a new species under the generic name Pepo. I tried to persuade him to publish it in Cucurbita, not considering Miller's Pepo to be tenable, even though it had been brought up by Britton. I told him that if he published in Pepo I should forthwith transfer it to Cucurbita; the sequel is disclosed in the synonymy at the head of this entry.

In describing the species in 1930 Small wrote: "The Okeechobee pumpkin is still by no means rare, although it is becoming more localized, for at least ninety-five percent of its former geographic area has been reduced by fire to ashes and smoke. And no advantages have been gained to compensate for that which has been lost, perhaps forever." I had once found the plant abundantly near Canal Point on the southeastern part of Lake Okeechobee, at the southern line of Palm Beach County. Recently W. M. Buswell, Coral Gables, has collected it and writes as follows: "There is quite a lot of it in low wet ground along the roadside and in different places through the growth of small trees on the other side of the fence between the road and lake, about five miles north of the St. Lucie Canal. It was about five miles above the canal that runs through Indian town. It was

151. Cucurbita pedatifolia, state of Quaretaro. Take note of the length of naked vine and the long free tendrils. Root unknown, but presumably tuberculate.



152. CUCURBITA LUNDELLIANA, of Campeche (Mexico), Guatemala, British Honduras. Root fibrous, annual or essentially so. Calyx-lobes commonly enlarged at end. Margined seeds in box.

the only place we could find the plants. They are many miles above Canal Point."

Before publishing on the Okeechobee gourd in 1930 I had visited the Indians on their islands in the Everglades and had seen the Seminole pumpkin. It is *Cucurbita moschata*, and has nothing to do with *C. okeechobeensis*. (See Gent. Herb. ii, 178.)

Twice or thrice I have taken the Okeechobee gourd in the wild. I have grown it at Ithaca, although it did not come to the fruiting stage. It happened that I was always too late in Florida for pistillate flowers although staminates were still abundant on the bushes. In October 1929 I was accompanied by E. G. Hume, son of Dean H. H. Hume of the University of Florida. Diligent search had failed to discover a pistillate flower. Finally we saw one about ready to expand, swinging on the limb of a dead tree about 30 feet or more above the ground, and hanging over the water. We could find nothing long enough to reach it. The vine would not rip loose. The tree was covered with poison ivy. The day was dark and the tail end of a hurricane was blowing itself out. Hume had a 22 Colt automatic pistol, woodsman model. He climbed the tree a short distance to get above the brush and gripped himself tight. Then he fired away. A bullet cut the stem cleanly and the flower floated to my feet in perfect condition and is shown at right in Fig. 97 in Gentes Herbarum, ii. It is the only pistillate flower of *Cucurbita okeechobeensis* I have ever seen in the wild.

†6. **Cucurbita Martinezii,** spec. nov. Fig. 150.

Scandens, pæne glabra: cirrhi longi, simplices vel 2-furcati: folia viridia, late cordato-ovata vel ovato-reniformia, 9–13 cm. lata, 8–12 cm. longa, angulata in ambitu, apex triangularis, sinus basalis profundus, margines cuspidato-dentati, paucis pilis brevibus appressisque et supra et infra; petiolus longus, non pubescens, paucis pilis brevibus apice: calyx staminatus pubescens, brevi-dentatus: pepo circa 8 cm. altus et latus, gravissimus, viridis subalbis parvis maculis, corium densum et durissimum; pedunculus longus, angulatus, expansus ubi affixus; semina ovata, spurco-alba, 10–11 mm. longa, 5–7 mm. lata, margo conspicuus.

Slender nearly glabrous vine, root unknown, with long spiralling simple or 2-forked tendrils, stems weak and striate and glabrous or soon becoming so: foliage green, scabrid but not harsh, thin; leaves broadly cordate-ovate to ovate-reniform, the blade 9–12 cm. broad and nearly as long from bottom of basal lobes, bearing few scattered short appressed hairs on either surface, shouldered but not regularly lobed, margins with short cusps terminating the veins, basal sinus usually deep but broad; petiole equalling or exceeding the blade, bearing a few stiffish short hairs particularly at the top: staminate calyx pubescent, with short angle-teeth rather than lobes: pepo very heavy, about 8 cm. diameter either way but a trifle longer than broad, green with nearly white faint dots and specks often more or less in lines but of no definite pattern, walls very thick and outer shell 3–5 mm. thick and very hard and inviting a saw rather than a knife; peduncle long,

angled, expanded at attachment; seeds ovate and pointed, 10–11 mm. long, 5–7 mm. broad, conspicuously margined, gray-white.

Atoyac, state of Vera Cruz, southern Mexico, *Maximino Martinez.*

†7. **Cucurbita pedatifolia,** spec. nov. Fig. 151.

Gracillima, pæne vel admodum glabra, radix ignota; axes striati, internodi longi: cirrhi simplices vel ramosus, longi et spirales: folia pauca, late cordato-ovata, 16–20 cm. lata et longa, divisa pæne ad basim, pedata, lobi 2–3 cm. lati, 10–15 cm. longi, obtusi sed sæpe apiculati, lobi laterales duplo-lobati, supra marmorati albo-viridi colore, petioli fortasse paucis setis: flores staminati campanulati, circa 5 cm. longi, tenuiter pubescentes; tubus calycis 12–15 mm. longus, lobi angustissimi, circa 1 cm. longi: pepo circa 6 cm. diam.

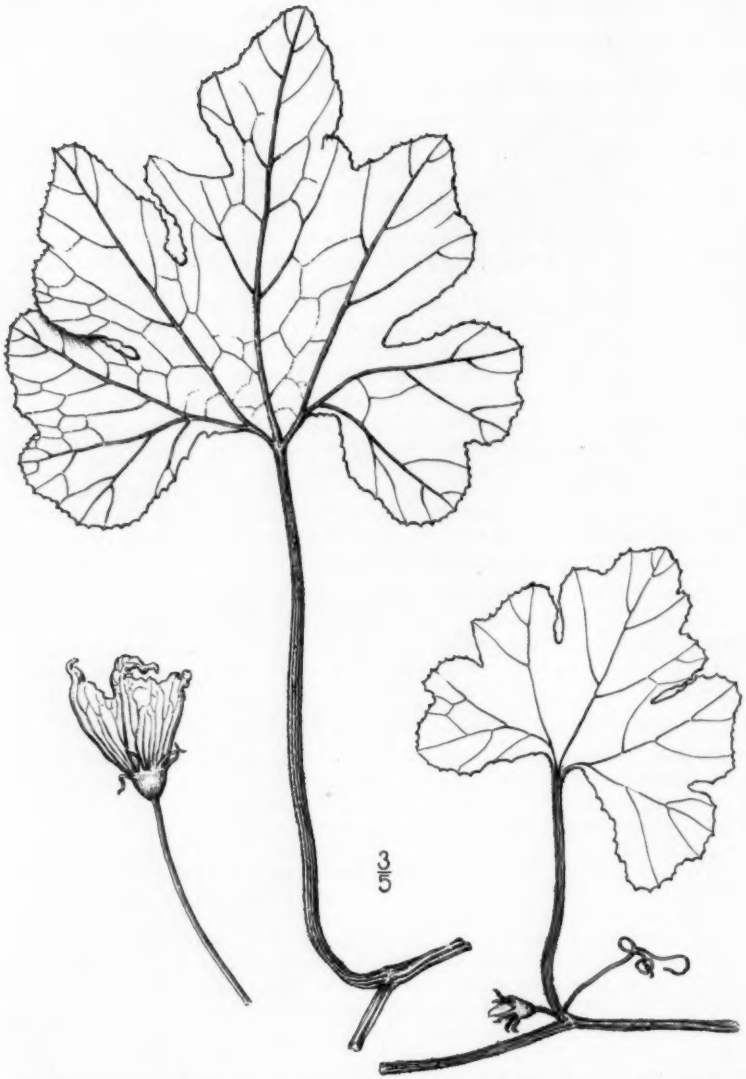
Very slender green and essentially glabrous plant, root unknown, the internodes long and weak; axis striate in drying, without spicules: tendrils simple or few-branched, long-spiralling as if the plant were a climber: leaves few, broadly cordate-ovate in outline, larger ones about 20 cm. broad and nearly or quite as long, divided nearly or quite to base, pedate, with 3 long narrow acute or apiculate lobes 2–3 cm. broad and 10–15 cm. long, lateral lobes again divided nearly to base, upper surface more or less mottled with whitish-green, both surfaces nearly glabrous; petiole usually bearing a few setæ but otherwise practically glabrous: staminate flowers campanulate, about 5 cm. long, thinly pubescent, corolla-lobes short-triangular and acute; calyx-tube 12–15 mm. long, the lobes very narrow, spreading, about 1 cm. long: pepo about 6 cm. thick.

State of Quaretaro, southern-central Mexico, *Painter & Rose 9781*, seen in National Herbarium. Two leaves of *Pringle 3519*, Cardenas, San Luis Potosi, may be the same; fruit noted as 2 inches across, white-and-green striped.

†8. **Cucurbita Lundelliana,** spec. nov. PETEN GOURD. Fig. 152.

Radix fibrosa; axes gracillimi, radicantes, sparse hirsuti vel glabri, non scabri, striati: folia late cordata, 5–9 cm. longa. 4–7 cm. lata, hirsuta, vix scabra, profunde 5-lobata cum sinubus latis obtusisque, lobis expansis obtusisque, marginibus minute crenulatis: flores solitarii, 6–7.5 cm. longi, lutei cum viridibus striis, acute lobati, calyci lobi sæpe spatulati: pepo brevi-campanulatus vel globulari-oblongus, 7 cm. longus, glaber, subviridis marmoratusque; semina 10–12 mm. longa, angustata, marginata.

Probably annual in its native regions, in cultivation producing a long hard taproot with coarse lateral fibers; stems slender, long-running, only sparingly rooting at nodes, softly thinly hirsute but becoming glabrous on the older parts, not scabrid or prickly, finely striate: tendrils mostly long and slender, often equalling or exceeding the leaves, usually simple or nearly so: leaves broadly ovate to nearly reniform in outline, base broadly cordate, dull green to ash-colored, blade 5–9 cm. long and nearly or quite as broad, thinly appressed-hairy and soft to the finger on the upper surface, rather more coarsely thinly clothed on under surface and veins perhaps lightly scabrid, deeply 5-lobed but the lateral lobes often shallower, lobes



153. Cucurbita Palmeri, native in Sinaloa. A non-spiculate species, perhaps annual, of which roots and pepos are not known.

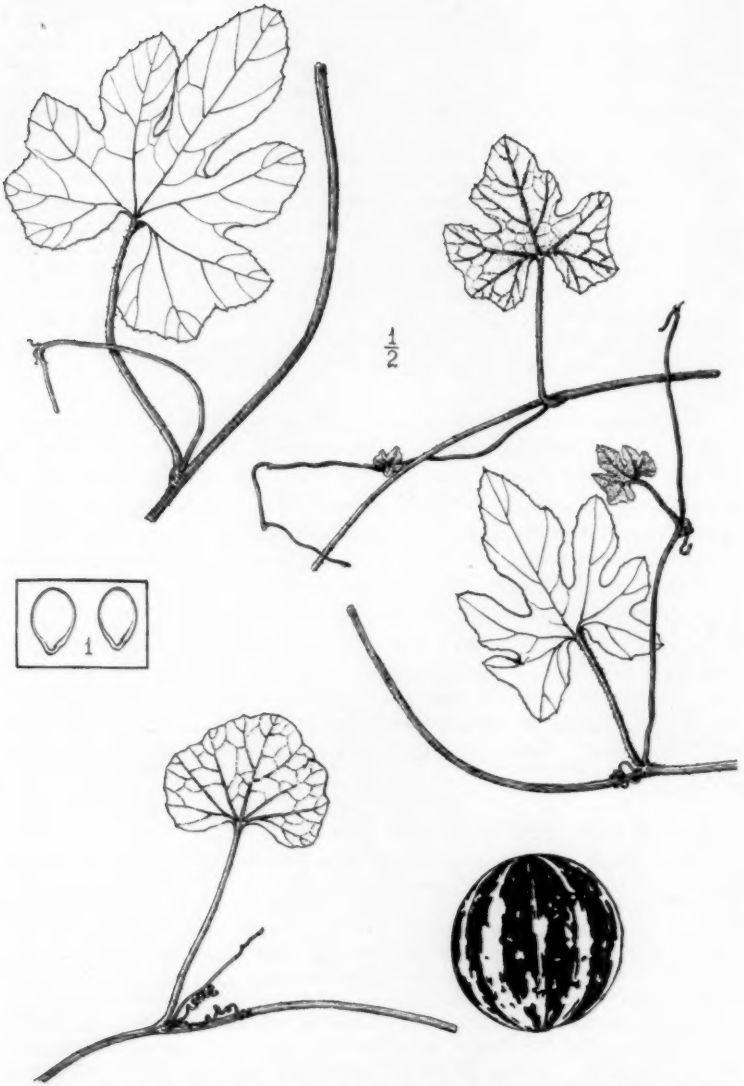
obtuse but ending in a brief mucro, sinuses prominent and very obtuse, broad middle lobe often bearing indefinite side lobelets, margins finely and sometimes almost sharply crenulate; petiole slender, loosely soft-hairy, usually longer than the blade (a few leaves on basal shoots sometimes scarcely lobed): flowers solitary, the staminates on long and very thinly hairy pedicels and campanulate corolla 6–7.5 cm. long and bearing pointed lobes and orange-yellow with green ribs; pistillate flowers short-pedicelled, of similar size and color; calyx-lobes narrow and sometimes small and pointed but frequently 2–3 cm. long with blunt expanded ends, the calyx-tube as well as corolla closely hairy-pubescent: pepo glabrous, globular-oblong or longer, usually tapering somewhat to stem and then short-campanulate, about 7 cm. long and 6 cm. broad, with a few obscure ridges, greenish to yellowish and lengthwise blotches of lighter color, the shell thin but becoming hard and durable; peduncle stout, prominently angled and furrowed, attached with a prominent ridge to narrowed base of pepo; seeds glabrous, 10–12 mm. long and 5–6 mm. broad at widest part, tapering to a long acute base, provided with a prominent raised wrinkled marginal ridge.

Guatemala, Campeche (southeastern Mexico), British Honduras. In 1933 Dr. C. L. Lundell, of the University of Michigan, sent me a pepo, number 3558 from Guatemala, and the following year I grew plants at Ithaca. I was attracted by the gray-marked foliage and the handsome large flowers. I recognized it as an undescribed specis, and reported it with a picture in my Garden of Gourds, 1937, pages 60, 61, as Peten gourd but without botanical identity. The geography of the species as I now know it is La Libertad, Department of Petén, Guatemala, *Lundell 3558* (type, Herb. Bailey); Nictun beach, Lake Petén, *Lundell 3152;* San Andres, Lake Petén, *Lundell 3202;* Tuxpeña, Campeche, *Lundell 992*, frequent; Vaca, El Cayo district, British Honduras, *Percy H. Gentle 2554;* Stann Creek Valley, Mountain Cow Ridge, British Honduras, *Gentle 3529*, "wild pumpkin," "bitter pumpkin"; Corozal-Consejo road, British Honduras, *Gentle 4925*.

†9. **Cucurbita Palmeri,** spec. nov. Fig. 153.

Planta cinerea, internodi breves: cirrhi breves debilesque 2–4 ramis: folia parva, cordato-ovata vel pæne reniformia, 14–16 cm. longa, 8–12 cm. lata, vel sæpe multo minora, non profunde undulato-lobata, 3 majoribus lobis ad apicem sinibus ad mediam laminam, margines denticulati, supra scabridi sed non hirsuti, infra cinereo-pubescentes brevibus rigidisque pilis, petiolus striatus et hirsuto-pubescens: flores parvi, 4–6 cm. longi; corolla campanulata; lobi calycis circa 1 cm. longi, angustissimi vel filiformes.

Grayish plant with small leaves, without spiculæ, root unknown; stems thin, angled, short internodes, shortly hairy-pubescent: tendrils short and weak, with 2–4 branches, the plant apparently not high-climbing: leaves gray in appearance, cordate-ovate to almost reniform, 8–12 cm. broad, often smaller, 14–16 cm. high from base of lobes, usually with 3 main lobes extending to about the center and the general margin shallowly undulate-



154. Cucurbita gracilior of southern Mexico, showing the various foliage, the pepo, and seeds. Flowers and root unknown, the latter probably tuberculate.

lobed giving the blade a scalloped look, base broadly and openly cordate, margins minutely denticulate, upper surface scabrid but hardly hairy, under surface stiffly whitish- or grayish-pubescent, petioles striate, hairy-pubescent: flowers small, pubescent; staminates 4–5 cm. long, campanulate, the calyx-lobes filiform and about 1 cm. long; pistillates 5–6 cm. long, calyx-lobes filiform or at least very narrow, 1 cm. long, not expanded at tips.

Northwestern Mexico, at Culiacan, Sinaloa, *Palmer 1802*, seen in National Herbarium (type) and Gray Herbarium.

†10. **Cucurbita gracilior,** spec. nov. Fig. 154.

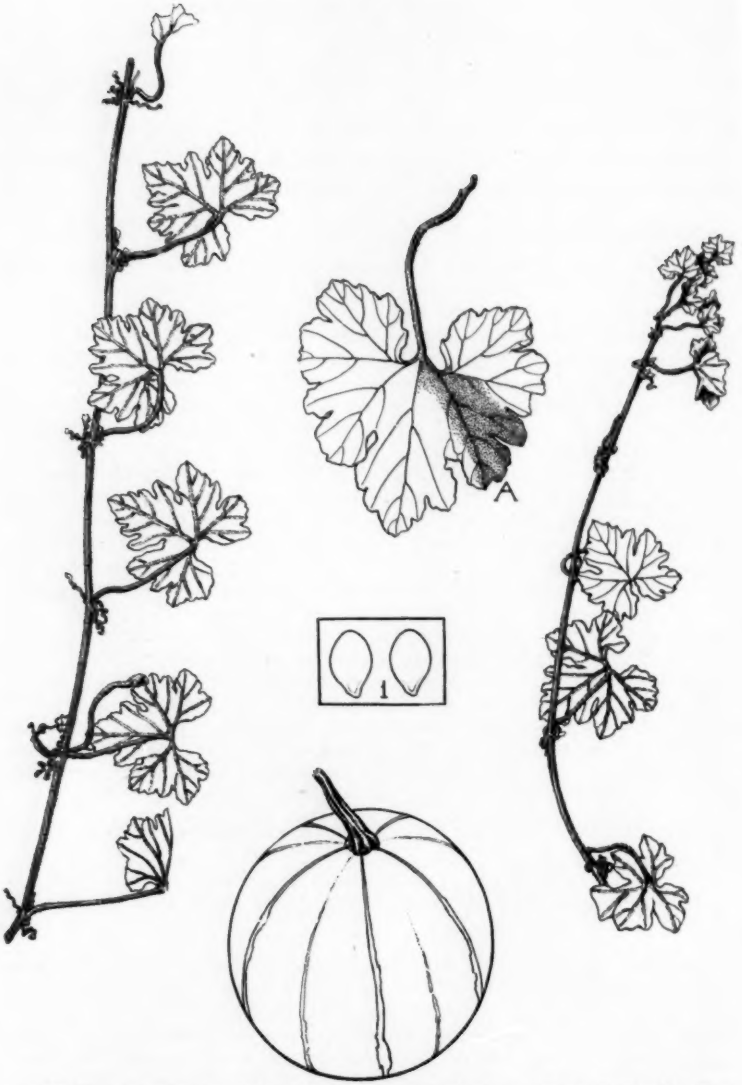
Radix ignota; probabiliter tuberculata: cirrhi parvi brevesque; axes gracillimi, angulati, pæne vel admodum glabri, non radicantes: folia parva, 9–10 cm. longa, 7–8 cm. lata, cordato-ovata, interdum non lobata sed fere 3-lobata ad medium vel inferius, lobi laterales sæpe duplo-lobati, sinus superiores angusti obtusique, lobi pæne obtusi sed cuspidati, margines irregulares sed denticulati, supra papulosi brevibus rigidisque pilis; petiolus validus, sparse pilosus et interdum parvis aculeis: pepo pæne globosus, circa 6 cm. longus, 5–5.5 cm. crassus, latis viridi-albis lineis et maculis; semina 10 mm. longa, 7–8 mm. lata, immarginata.

Weak plant probably producing tubercles; stems very slender, angled, nearly or quite glabrous (not soft-hirsute as in *C. radicans*), the many branches very slender and apparently not radicant: tendrils usually very small, only an occasional one with a developed branch, the plant probably not high climbing: leaves small, cordate-ovate in ambitus, 9–10 cm. long, 7–8 cm. broad, usually 3-lobed to middle or more and sinuses obtuse (but sometimes almost unlobed), basal lobes perhaps again lobed or sinuate, lobes nearly or quite obtuse but commonly with a mucro, margins irregular but denticulate at nerve ends, upper surface rough with scattered short stiff hairs, under surface papulate and provided with short stiff hairs; petiole stout, sparsely pilose and sometimes with brief pricklets: peduncles bristly: pepo oblong-globose, about 6 cm. long and 5–5.5 cm. thick, attractively banded and mottled with greenish-white; seeds ovate-oblong, not conspicuously tapered, about 10 mm. long and 7–8 mm. broad, not margined.

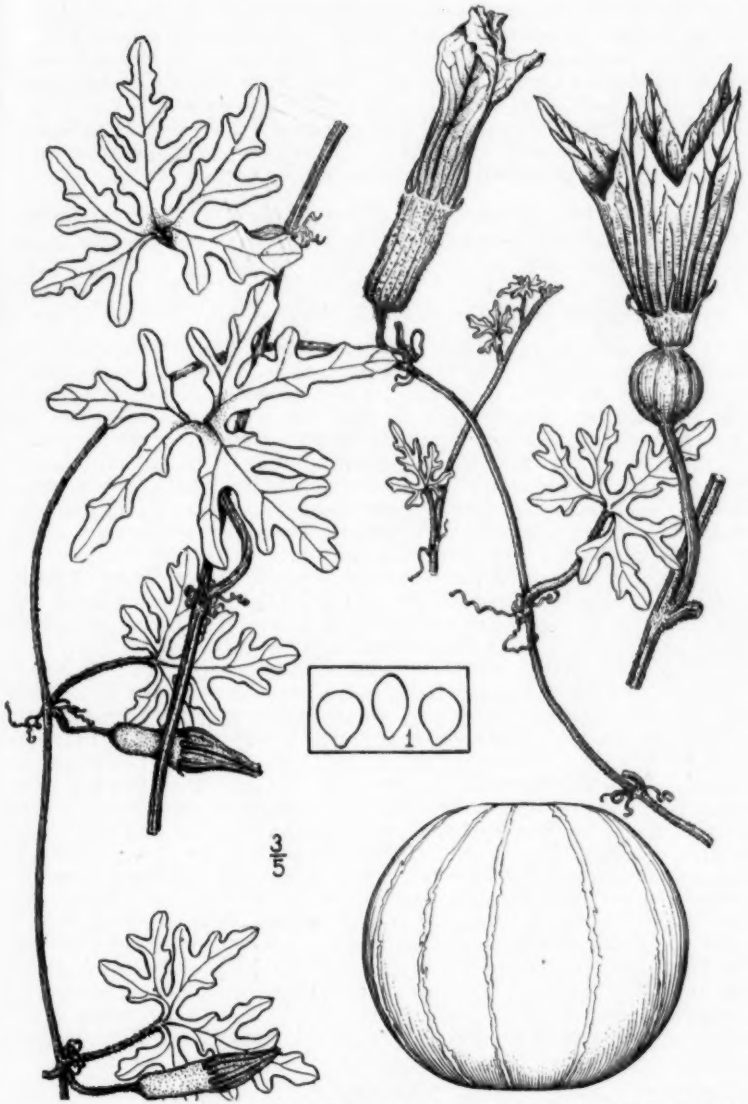
Southern Mexico: Villa del Carbón, state of Mexico, latitude about 20°, *Maximino Martinez.*

11. **Cucurbita cordata,** Watson, in Proc. Amer. Acad. Arts & Sci. xxiv, 50 (1889). Fig. 155.

Perennial from "long and large" root, gray-canescent in foliage; stems slender, sharply angled, closely but thinly pubescent, angles with retrorse hairs: tendrils very small and tightly coiled as if scarcely functioning in climbing: leaves small, broadly cordate-ovate or ovate-reniform, 4–8 cm. long, 5–10 cm. broad, 3-lobed part way or not to the middle and these parts again shallowly and short-acutely lobed, margins more or less irregularly toothed, upper surface covered with close appressed hairs that hide the numerous minute dots or papulæ that become apparent when old leaves become otherwise bare, under surface closely gray-hairy and papu-



155. Cucurbita cordata, known from only one collecting in Baja California. Characteristic papillate markings on upper surface of leaf suggested at A. Root not seen. Plate about one-half natural size.



156. CUCURBITA CYLINDRATA, Baja California. Note the cylindric calyx-tube of the staminate flower, three of them showing. Root unknown.

late and the veins bearing larger and stiffer hairs; petiole about the length of blade, stout, covered with stiff reflexed hairs: pistillate flowers about 7 cm. long, corolla pubescent-hirsute, calyx-lobes very slender and short, ovary oblong and scantily pubescent: pepo depressed-globular, about 8 cm. thick and 7.5 cm. high, green, bearing 5 definite narrow carpellary stripes of lighter color and secondary stripes with intermediate blotches; peduncle strongly angled, somewhat expanded at attachment; seeds plump, ovate, 11 mm. long, 7–8 mm. broad, edges obtuse, not marginate.

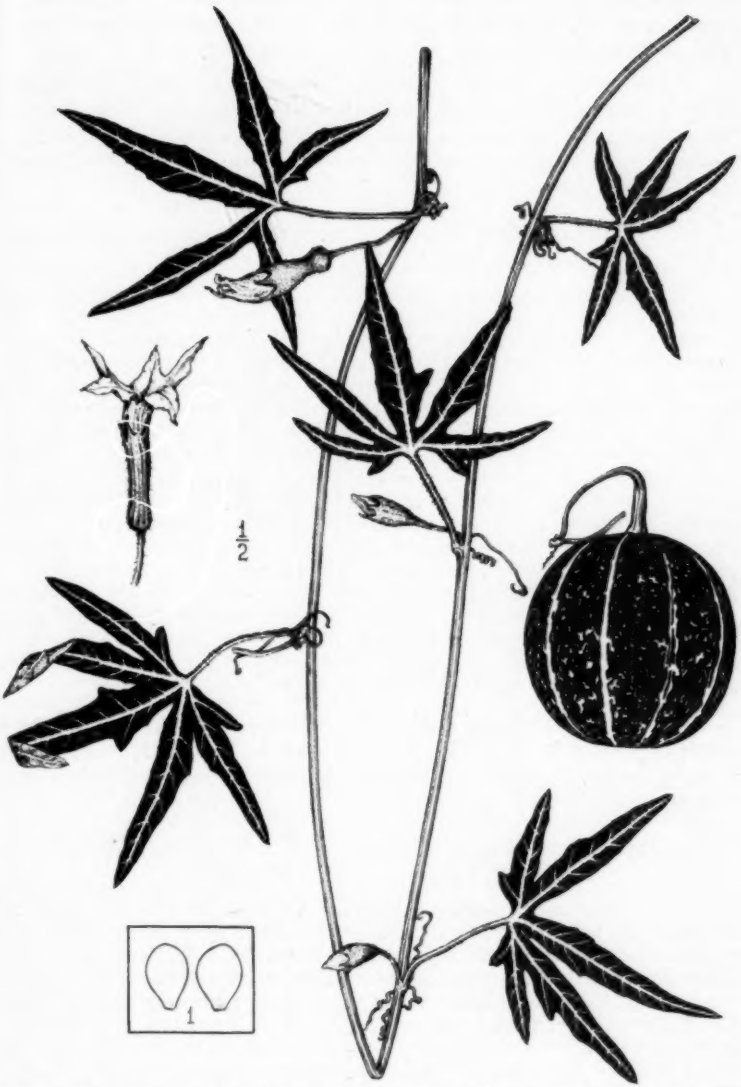
Baja California, Mexico: sandy plains near Los Angeles Bay, *Edward Palmer 584*, collected December 1887 (type, Herb. Gray); the only known locality.

†12. **Cucurbita cylindrata,** spec. nov. Fig. 156.

Cinerea planta, probabiliter perennialis; axes obtuse angulati vel pæne teretes, parce pilosi, non retrorsi: cirrhi parvi, rami stricte glomerati: folia late cordato-ovata, 7–10 cm. longa et lata, pedata, dissecta ad basim in aliquot angustos, obtusissimos, integros vel dentatos lobos, supra vix papulata sed rigidis, appressis pilis cinereis tecta, infra cinereo-pilosa: flores staminati 5–7 cm. longi, pubescentes, tubus cylindricus, lobi calycis 7 mm. longi, angustissimi; flores pistillati 8–9 cm. longi, corolla valde venosa, pubescens, lobi calycis breves angustique: pepo oblato-globosus, 8 cm. crassus, 7 cm. longus, 10 irregularibus lineis; semina turgida, ovata, 9–10 mm longa, 6–7 mm. lata, immarginata.

Presumably perennial but root unknown, plant gray; stems obtusely angled to almost terete and striate, sparingly pilose, with very few if any retrorse hairs and those very weak: tendrils small and weak, branched near the base, mostly coiled on themselves: leaves broadly cordate-ovate, 7–10 cm. across either way, pedate, divided to the base and the lateral ones again divided, the lobes again lobed so that the blade has a dissected look (this dissection pertaining even to the young leaves at the growing tips), the main lobes 3–5 cm. long and often only 1 cm. or less long, the sides perhaps bluntly toothed or angled, apices conspicuously obtuse even though infrequently apiculate, upper surface not papulate or not conspicuously so, covered with appressed stiff short gray hairs, under surface also covered with gray appressed hairs; petiole stout, covered with short hairs some of which may be reflexed: staminate flowers with conspicuous cylindric corolla-tube and calyx-tube when flower is ready to expand, the tubes together 5–7 cm. long, pubescent and the calyx-tube papulate, calyx-lobes very narrow and short, 7 mm. or less long; pistillate flowers 8–9 cm. long at anthesis, corolla very veiny and pubescent, calyx-tube less than 1 cm. long, the lobes short narrow and inconspicuous: pepo oblate-globose (somewhat flattened at poles), 8 cm. thick, about 7 cm. long, with about 10 narrow but irregular stripes of light or whitish-green, and various mottlings; seeds small, turgid, irregularly ovate in outline, 9–10 mm. long, not marginate, edges very obtuse.

Baja California, Mexico: Miraflores, *C. F. Harbison 27244* (type, Herb. San Diego Soc. Nat. Hist.); Santa Gertrudis, *Harbison 27240;* mesas and sandy washes between Rancho Mesquital and Calmalli, *Wig-*



157. CUCURBITA DIGITATA, a clearly marked species from New Mexico, Arizona, southern California, Sonora.

gins 5405; eight miles west of Calmalli, *Haines and Stewart;* Primiera Agua, near Loreto, *M. E. Jones 27107;* about 27 miles south of Pozo Aleman, *Wiggins 7868;* Santa Rosalia, *Roxana S. Ferris 8691.*

This plant has passed for *Cucurbita cordata,* but is at once distinguished by its leaves multisect to base, lobes narrow and obtuse, somewhat different investiture, fruits flattened at ends and markings singular, seeds smaller; probably other dissimilarities would appear if the plants were growing side by side in the field.

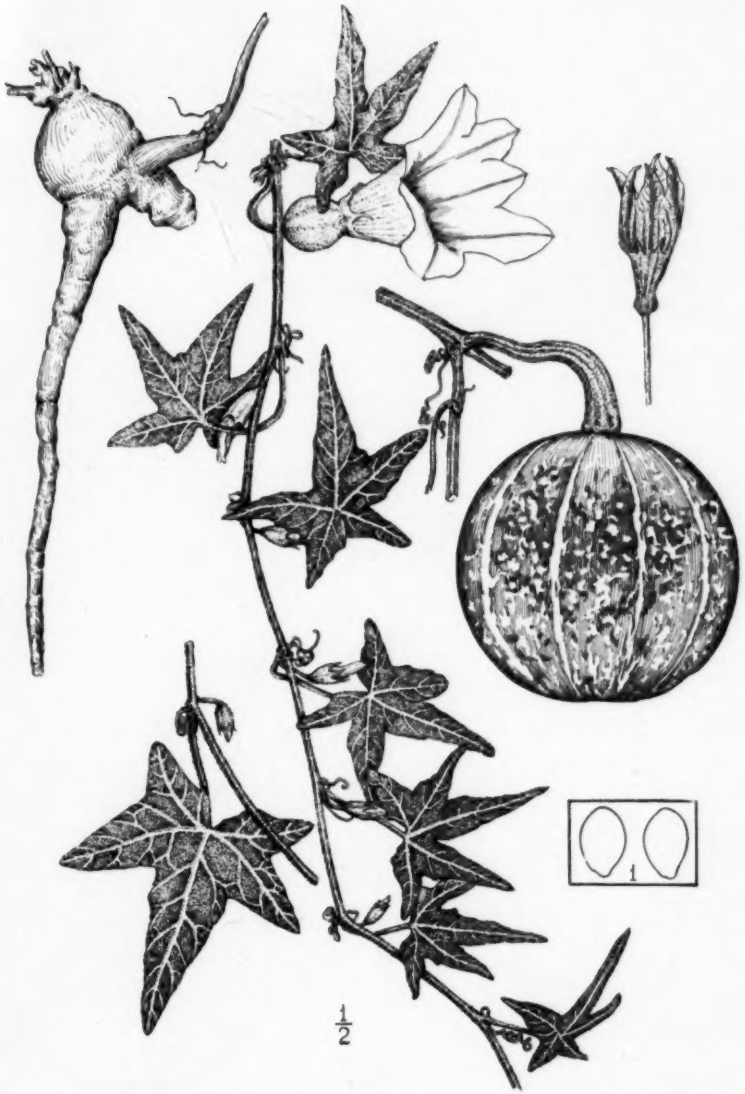
13. **Cucurbita digitata,** Gray, in Plant. Wright. ii, 60 (1853), Smithson. Contrib. to Knowl. Fig. 157.

Perennial by a deep fleshy fusiform root; stems very slender, angled and sulcate, sparsely pilose; tendrils very short, the branches coiling into heads or tufts as if the plant were not a high climber: leaves grayish-dark-green, the midribs usually lighter in color, pedate, the 3 main lobes extending to base of blade and the 2 lateral lobes divided again nearly to base, the lobes linear-lanceolate-acuminate and often with a few obtuse angles or teeth on sides, 5–10 cm. long, 5–20 mm. broad, upper surface asperulate with whitish points and perhaps appressed hairs along the rib, under surface with close sharp points and a few hairs; petiole bearing bulbate points: staminate flowers narrow-campanulate, tube of corolla 3–4 cm. long and thinly pilose, lobes triangular-acute and mucronate; calyx-tube cylindric, about 3 cm. long, hirsute, the lobes 7–10 mm. long and very narrow: pepo slightly oblong-globose, when full grown and full size weighing about 10 ounces, 8–9 cm. high and slightly less in breadth, dark vivid green, the carpellary whitish-green stripes narrow, well-defined and very distinct, with small marblings of the same color; peduncle slender, little expanded at attachment, shallowly ridged; seeds white, ovate with obtuse point, 10–11 mm. long, 7–8 mm. broad, not marginate, the edges thick and obtuse.

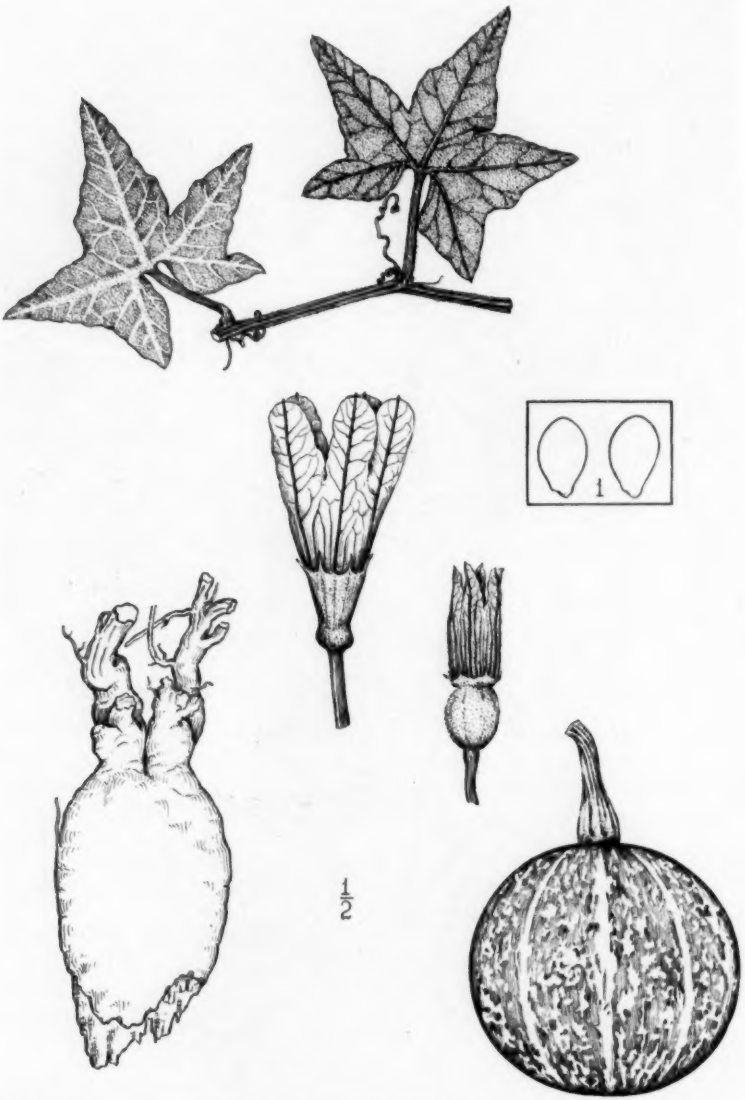
Dry and desert regions, New Mexico, Arizona, sparingly in southeastern southern California (Riverside County) and in Sonora, Mexico, a well marked species. Founded on *Charles Wright 1088* from New Mexico; type in Herb. Gray.

14. **Cucurbita palmata,** Watson, in Proc. Amer. Acad. Arts & Sci. xi, 137 (1876). Figs. 141, 158.

Gray perennial, with a long deep durable fusiform root that may be bifurcate or trifurcate; stems angled or sulcate, gray with short stiff retrorse hairs and bulbate pricklets: tendrils commonly very short, the branchlets mostly coiled into a head or ball and the plant apparently mostly confined to the ground: leaves many and closely placed, canescent, thick and coriaceous, 6–10 cm. broad and long, variously cordate or recessed at base, cut to below the middle into 5 narrow acuminate-pointed and cuspidate lobes, the central or terminal lobe being 5–6 cm. long and about 2 cm. or less broad at base, upper surface densely covered with close short stiff gray hairs, under surface closely beset with stiff hairs and bulbate pricklets, veining on both surfaces very prominent and usually light colored above,



158. CUCURBITA PALMATA, western Arizona, California, Baja California. Root at upper left; see also Fig. 141. It is a muriculate species. Note shape of peduncle at attachment to pepo.



159. CUCURBITA CALIFORNICA. Observe the stout thick fusiform root, and the triangular lobes of leaf. Western Arizona, California, Baja California. Root one-fifth full size.

160. CUCURBITA GALEOTTII. Drawn from the original specimens in Herbier du Jardin botanique de Bruxelles. Oaxaca; little known.

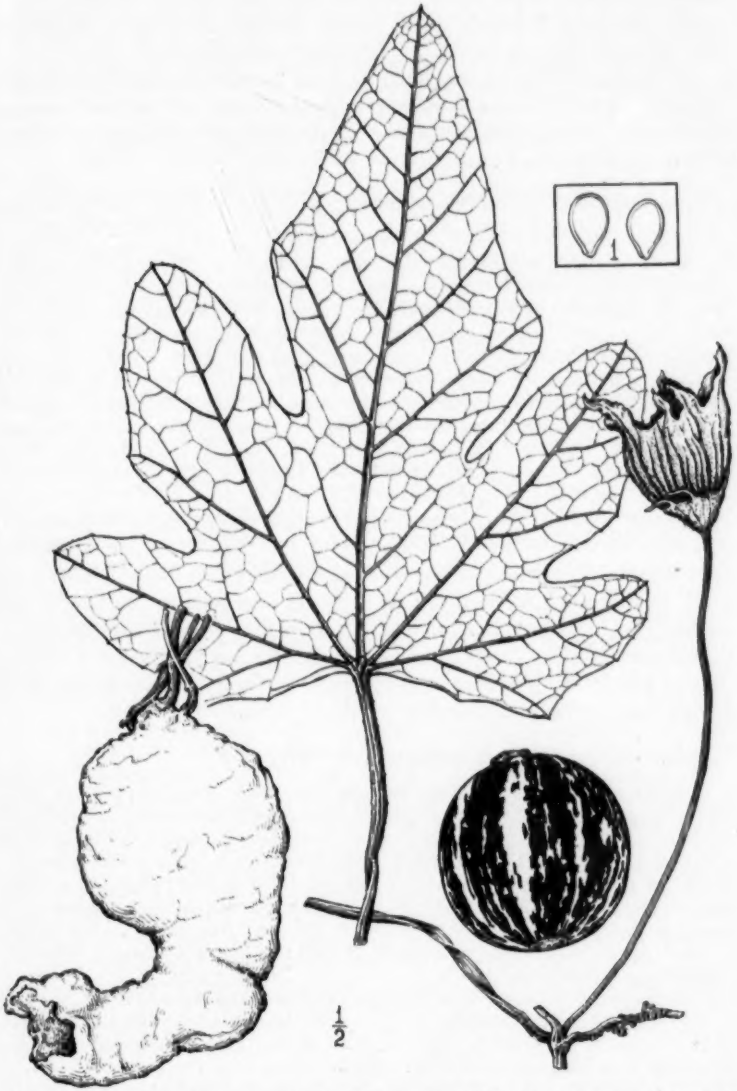
margins entire, involute in drying and stiff-hairy; petiole usually shorter than blade and roughly covered with bulbate pricklets: staminate corolla narrow-campanulate, 6–7 cm. long, 4–5 cm. broad, pubescent, strongly ribbed; calyx-tube 2–2.5 cm. long, narrow and constricted above the base, tomentose-pubescent, the thin pubescent lobes 6–10 mm. long and erect or spreading; pistillate flowers about 8 cm. long, corolla narrow-campanulate, pubescent, strongly ribbed and nerved, ovary 2.5 cm. long and thinly pilose, calyx-lobes very small: pepo large and heavy, weighing 10–11 ounces when fresh, nearly globular, 8–9 cm. long and broad, dull light green marked with broad ill-defined longitudinal bands and splashes of greenish-white; peduncle stout, thickened on lower part and sulcate, not expanded at attachment; seeds very white, narrow-ovate, 10–12 mm. long and 7 mm. broad, without raised margin.

Southern California from the Mohave southwards in interior valleys and at low elevations, western Arizona, northern Baja California, inhabiting dry and desert regions. Type in Herb. Gray from Cajon Valley, San Diego County, *D. Cleveland.*

15. **Cucurbita californica,** Torrey ex Watson, op. cit. 138; Bot. Calif. i, 240 (1880). Fig. 159.

Commonly a grayer plant than *C. palmata*, root swollen and not long-tapering: leaves much more broadly lobed, the upper lobes triangular and usually only twice or less longer than broad, lobes not long-acuminate and not narrowly acute even if shortly mucronulate, base of leaf more uniformly cordate and margins not likely to be involute, upper surface of leaves more uniformly or more densely covered with gray hairs, under surface short-hairy as well as papillate and the veins more scantily if at all supplied with bulbate pricklets: pepo with less clearly defined longitudinal bands when fresh and likely to be a little broader than long, about 7–8.5 cm. either way and weighing 8–9 ounces; seeds usually larger and plumper, 13–14 mm. long and 8–9 mm. broad, duller in color.

California, Kern, San Bernardino, Riverside, San Diego and probably other counties, in localities similar to those of *C. palmata;* Mohave County, Arizona; northern Baja California. Type in Herb. New York Botanical Garden but not at present available, collected according to Watson, "by Dr. E. Pickering on the Wilkes Exploring Expendition, at some locality in the Sacramento Valley." Watson noted that the flowers are much smaller than those of *C. palmata*, being "scarcely more than an inch long." In Botany of California four years later Watson states that what is apparently this species was found "by Emory on Cariso Creek in the southern part of the State" (San Diego County). In this treatment he notes an essential difference between the two species, lobes lanceolate-acuminate in *C. palmata*, lobes triangular in *C. californica*. In 1883 C. C. Parry published an account of *C. californica*, with good picture of leaf and a cross-section of fruit in Bulletin of the Torrey Botanical Club, x, page 50. He thinks it is "readily distinguished" from *C. palmata*, but I have not verified his "fruit



161. CUCURBITA SCABRIDIFOLIA, southern Tamaulipas. Note the tuberous woody root; staminate flower, pepo, seeds.

becoming lobulated when dry." Size of flowers apparently depends on the conditions under which the plant grows. I grew *C. californica* at Ithaca, New York, in 1895, seeds said to have come from Arizona.

Differences between this plant and *C. palmata* appear to be strong enough to separate them as independent species; yet careful field observations over the territories may show such inconsistencies that the titles may best be associated as *C. palmata* var. *californica*.

16. **Cucurbita Galeottii,** Cogniaux, in DC. Monogr. Phan. iii, 551 (1881). Fig. 160.

Stout plant, presumably climbing, with very robust 3-fid sulcate sparsely villous-hirsute tendrils, duration unknown; stems thick, angled, sparsely aculeate: leaves narrowly triangular, membranaceous, 12–16 cm. long and 9–12 cm. broad, apex acute, base truncate, margins minutely and sharply denticulate, irregularly and very briefly laterally lobed with acute sinuses, upper surface intensely green and sparsely hirsute and becoming white-punctate, under surface grayish-green, shortly and densely hirsute and the nerves sparsely long-aculeate; petiole stout, terete, 10–15 cm. long, sparsely long-aculeate: staminate flowers on stout sulcate densely pilose peduncle 8–15 cm. long, corolla narrowly campanulate, 6 cm. long, with lanceolate segments; calyx-tube short, 1 cm. or less long and 7–8 mm. broad, narrowed to base, hispid, lobes long and slender, spreading, 4–5 cm. long and much exceeding the tube, at apex expanded to 1–2 mm. broad.

Southern Mexico: San Pedro Nolasco, northeast of the City of Oaxaca about latitude 17°, collected by H. Galeotti, author with Martens of Les fougères du Mexique in 1842. I have not seen specimens nor do I know of subsequent collections. Fig. 160 is drawn from essential parts of the two sheets of Galeotti specimens in Herbier du Jardin botanique de Bruxelles, of which I have had photographs for many years.

†17. **Cucurbita scabridifolia,** spec. nov. Fig. 161.

Planta tetrica; radix longum lignosumque tuber, 6–7 cm. crassum; axes bulbatis aculeis: cirrhi breves et validi, rami facientes caput: folia scabrida supra et infra, longo-triangularia, 20 cm. longa, 12–18 cm. lata, lobi laterales 2, ascendentes, obtusi et apiculati, basis truncata, sinus aperti obtusique, margines pæne integri, supra et infra rigidis brevibusque pilis, petiolus bulboso-muricatus: flores staminati late campanulati, conspicue nervati, 6 cm. longi, corolla hirsuta extra; tubus calycis circa 15 mm. longus, lobi 1 cm. longus, angustus: pepo pæne globularis, 6–7 cm. longus, lineis irregularibus viridi-albis.

Rough plant, a tuberous perennial; stems marked with bulbate prickles or the scars of them: tendrils short and the branches coiling into a head as if the plant were not a high climber: leaves long triangular in ambitus, to 20 cm. long and 12–18 cm. broad, with strong continuing midrib, 2-lobed on either side, lobes ascending and mostly obtuse at apex even though apiculate, central part or lobe much exceeding the others, sinuses open and obtuse, base of blade truncate, margins entire except for mucros at points of

veins, scabrid on both surfaces with bulbate pricklets and stiff short hairs, upper surface somewhat marbled and lower surface with prominent brown ribs; petiole stout, scantily pubescent, bearing prominent pricklets: staminate flowers very broadly campanulate and conspicuously nerved or ribbed, perhaps 6 cm. long, corolla hairy outside; calyx-tube one-third length of corolla-tube, the very narrow lobes about 1 cm. long: pepo oblong-globular, 6–7 cm. long, marked with irregular and indefinite lines and blotches of light greenish-white.

Northeastern Mexico: between Miquihuana and Palmillas, southern Tamaulipas, *Maximino Martinez*.

18. **Cucurbita fœtidissima,** HBK. Nov. Gen. et Sp. ii, fol. ed. 98 (1817), small ed. 123. CALABAZILLA. Figs. 162, 163.

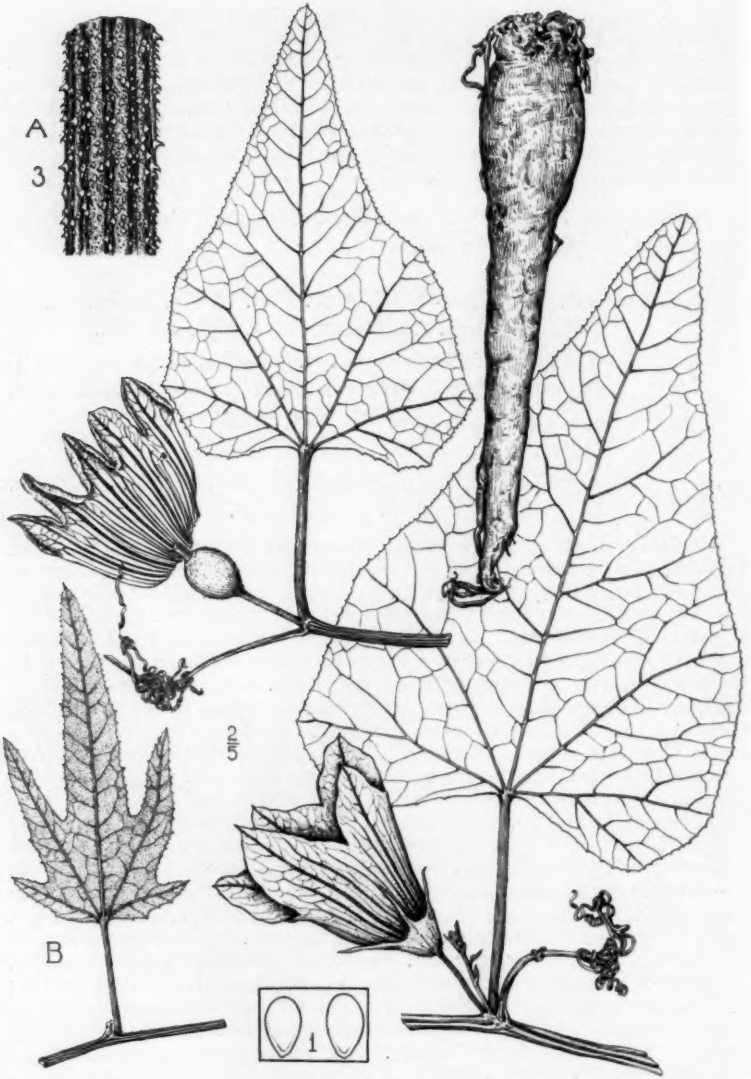
Cucumis perennis, James, in S. H. Long, Exped. Rocky Mts. ii, 20 (1820); Thwaites Early Western Travels, xv, 2, p. 312–3.

Cucurbita perennis, Gray, in Bost. Journ. Nat. Hist. vi, 193 (1852).

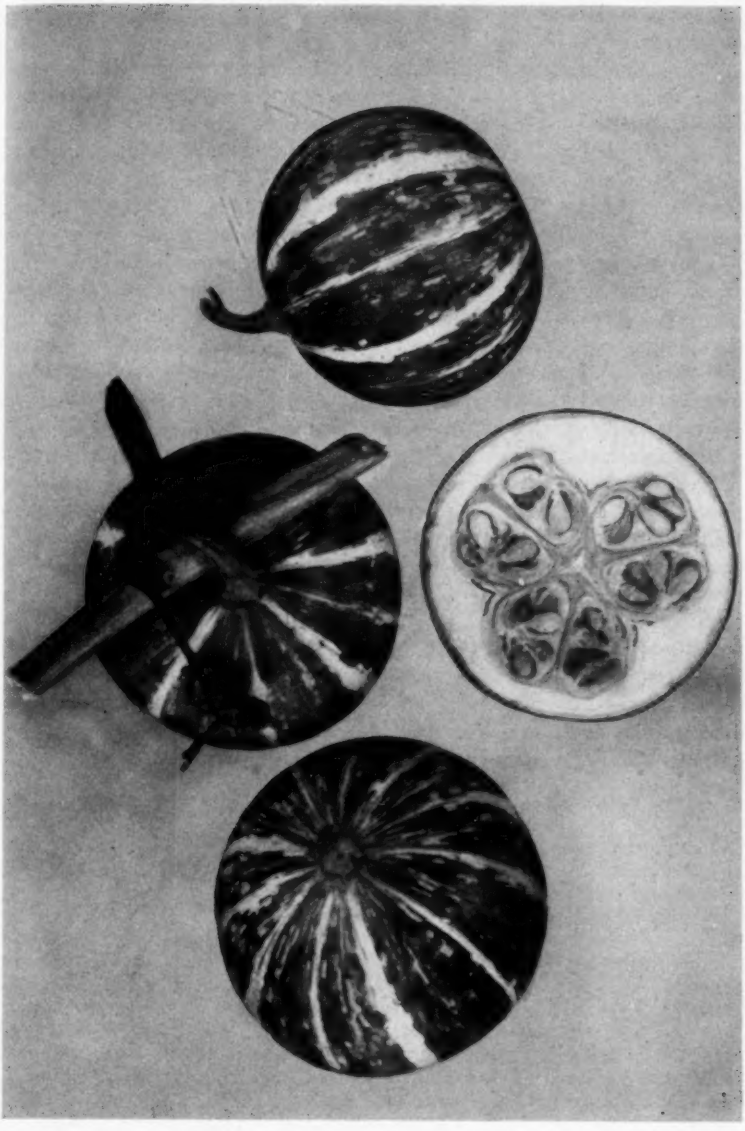
Pepo fœtidissima, Britt., in Britt. & Brown, Illus. Fl. North. U. S. and Can., 2d ed. iii, 291 (1913).

Variable coarse rough perennial, eventually forming large persisting colonies, plant commonly but not always strong-smelling, root fusiform, perpendicular, and sometimes 2 m. deep and 25 cm. thick; axis angled and cornered, muriculate and sometimes thinly pubescent: tendrils stout but remaining short, the branches mostly coiled into a head and the plant mostly confined to ground or covering wastes: leaves diverse, gray-green to cinereous, mostly triangular-ovate, 15–30 cm. long and two-thirds as broad at base, openly cordate to nearly truncate, apex acute and usually mucronate, sometimes angled, in the United States commonly not lobed but in Mexico sometimes prominently lobed, margins sinuate-denticulate to practically entire, upper surface very veiny and stiffly pubescent and scabrid, under surface similar but usually grayer and framework very prominent, ribs and veins muriculate; petiole stout, finely pubescent and roughly muriculate: staminate flowers large, 10–12 cm. long, corolla ribbed and veiny, rough-pubescent, lobes broad and apiculate at apex; calyx-tube 15–20 mm. long, pubescent and muriculate, the linear lobes 2–3 cm. or more long; pistillate flowers 9–10 cm. long, ovary pubescent, corolla pubescent, much ribbed and veined; calyx-lobes narrow, 1 cm. long more or less: pepo slightly oblong-globular, 6–7 cm. high and commonly a little broader, weighing 6–7 ounces when fresh, 3-loculed, dull light green marked with 5 or 6 main cream-white stripes and a few intermediate ones and many narrow mottlings; peduncle angled, expanded at attachment; seeds small, oblong-ovate, 12 mm. long, 6–7 mm. broad, immarginate, edges obtuse.

Hard and waste dry land, prairies, old washes, Nebraska, Missouri, Kansas to Colorado and Utah-Nevada, Texas, New Mexico to California, Mexico as far south as Guanajuato. A well known long-lived dull green or



162. CUCURBITA FŒTIDISSIMA, calabazilla, central and southwestern United States and Mexico. Tuberous (not tuberculate) root of plant, only two or three years old, 18 inches long. Piece of petiole at A, enlarged, to show the muricules. At B a leaf from Coahuila that may or may not belong to this species, its flowers, pepos and roots unknown. Note contracted tendril, coiled on itself, suggesting a ground vine.



163. FRUITS OF CURCUBITA FŒTIDISSIMA, southern California, about three-fourths natural size. Take note of the flat expansion of peduncle at point of attachment. The three placentæ with out-forking branches seen indistinctly at v, v, v marks on the cross-section.

gray harsh plant, some colonies yielding abundant crops of gourds year after year.

This plant is so variable in leafage that one may wonder whether more than a single species is involved. It was first made known botanically to North Americans in 1820 by Dr. Edwin James (1797–1861) as *Cucumis perennis*, from "arid and sandy wastes, along the base of the Rocky Mountains, from the confluence of the Arkansa, and Boiling Spring Fork, to the sources of the Red River"; type or original specimens are in the herbarium of the New York Botanical Gardens but are not now available for consultation. Asa Gray transferred it in 1852 as *Cucurbita perennis*, and under this name it remained until in 1881 when Cogniaux brought up the name *Cucurbita fœtidissima* of Humboldt, Bonpland and Kunth, having seen the Bonpland specimen in Paris. There may still be a question whether *fœtidissima* and *perennis* are conspecific; this problem is to be settled by examination of the two type specimens when international situations allow, and by much more careful search and collecting in the field. *C. fœtidissima* was based on a plant said to be annual, with sinuate-angled leaves, sometimes lobed. In Mexico one sometimes sees decidedly deeply lobed leaves that cannot be resolved without roots and flowers and fruits. When Gray made the transfer of *perennis* from Cucumis to Cucurbita he questioned whether it might "be the Cucurbita fœtidissima, HBK. as Dr. Torrey long since suggested." Ninety years have passed, and still we do not know.

Why the plant of this cucurbit sometimes does not emit a strong odor should make an interesting problem for a physiologist. One reason why Gray did not take up the name *fœtidissima* is because the plant he grew at Cambridge was not fetid.

We still need a careful taxonomic study of this species.

SUPPLEMENT

Certain native or at least wild plants come to me as Cucurbita that belong to other genera. A few of these we may examine in order to clarify our genus and perhaps to extend our knowledge of those plants themselves.

A frequent confusion is with Apodanthera. This is an occidental genus of 25 to 30 species, ranging from western Texas to Peru and Brazil. It differs technically from Cucurbita in the staminate flowers being usually two or more on a peduncle, and the anthers free rather than connivent or coherent; fruit is usually small and not durable. The only species that looks much like a Cucurbita is *A. undulata*, Gray, from western Texas to Arizona and northern Mexico. The several or many staminate flowers in a single inflorescence at once distinguish the plant. I have pieces with staminate flowers of another plant from the state of San Luis Potosi, coming as a Cucurbita, that look much like small-leaved forms of *Cucurbita Lundelliana;* it is apparently an undescribed Apodanthera, but material is not sufficient to resolve it.

CUCUMIS

The commonest confusion is with a plant ranging from Louisiana to Arizona that is not yet in any of the floras of the region, apparently well naturalized from cultivation. It is a Cucumis. I have grown the cultivated plant, as Dudaim and Odoratissimus melon, over many years; the little wild fruits also have been sent me from Louisiana and Texas and I have grown the plant; I have wanted to explain the case in print in order that the species may be included in the manuals, and now is the opportune time.

Cucumis Melo, Linn. var. **Dudaim,** Naudin, in Ann. Sci. Nat. Bot. ser. iv, xi, 69 (1859). DUDAIM MELON. Fig. 164.

Cucumis Dudaim, Linn. Sp. Pl. 1011 (1753).

Cucumis odoratissimus, Moench, Meth. 654 (1794).

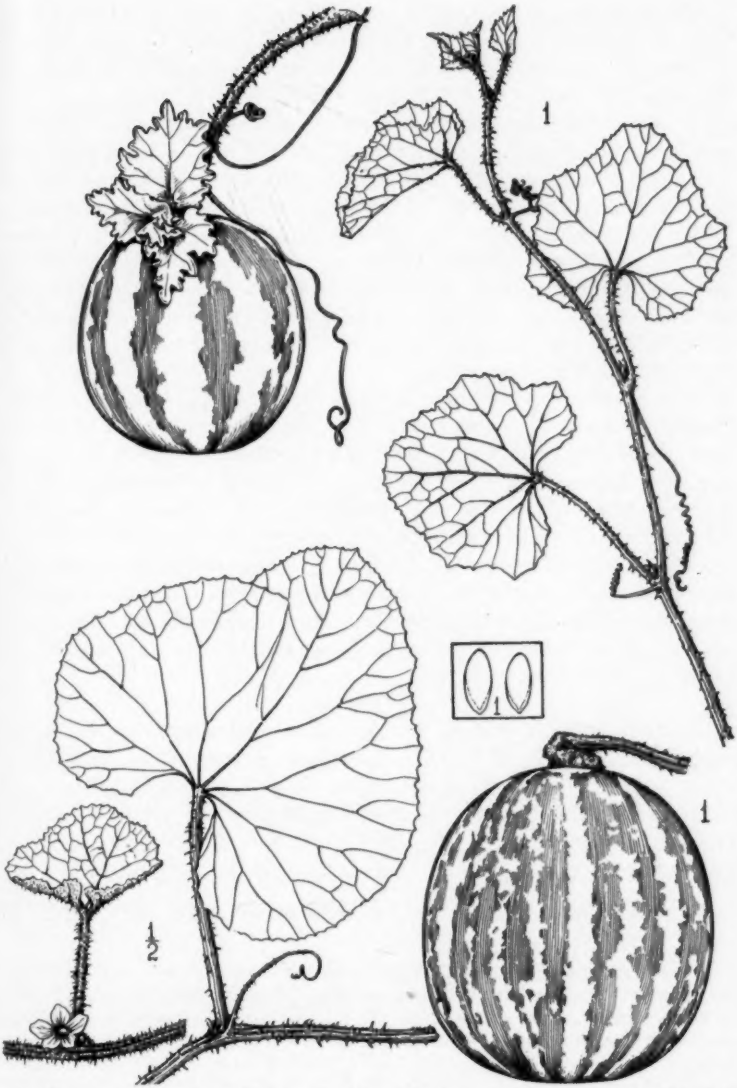
Slender tendril-climbing annual vine of small dimensions and medium-sized nearly or quite unlobed thin leaves; axis striate or channelled, carrying few or many short spiculæ but otherwise practically glabrous: tendrils simple, very slender, much spiralled: leaves broadly cordate-ovate, sometimes 12 by 15 cm. broad and long but commonly much smaller particularly in the wild, not lobed or only obscurely undulate, basal sinus narrow to broad, apex usually with a broad cusp, margins serrulate, upper surface somewhat scabrid, under surface spiculate on the ribs, petiole spiculate and sparingly pilose: staminate flowers solitary, very short-peduncled or almost sessile in the axils, light yellow, 2–3 cm. across in expansion; pistillate

flowers solitary, rather prominently peduncled, corolla small in proportion to the ovary, the latter conspicuously soft-hairy: pepo small, various in shape but in cultivation commonly 6–8 cm. long or thick, globular, oblong-globular, or somewhat oblate or even ovoid, green with several yellow-green irregular longitudinal stripes and flecks of the same color between, pubescent at maturity, usually emitting a mild and pleasant musky odor but often nearly or quite scentless; seeds narrowly oval, 8–9 mm. long and 3–4 mm. broad on the cultivated plant but less in the smaller wild fruits, smooth, dull white, surface not marked or embellished.

Probably a cultigen. *Cucumis Melo* is attributed as a wild plant to central Asia and tropical Africa; I have not seen any of the usual domestic forms of it tending to run wild. Dudaim was assigned by Linnæus to Egypt and Arabia, which probably signifies oriental; herbalists referred it also to Persia and the Orient. It has been long in domestication; it is apparently not eaten, but grown for the ornamental and fragrant fruits; sometimes known as Queen Anne's Pocket melon. In the Louisiana swamps and flood-plains it grows as if truly wild. I have had the wild fruits under the name "smell melon" and "stink ball," but they are not always fragrant when I grow them in the North. In some cases the stripes do not develop strongly on the fruits or may more or less disappear. In dry years the pepos in the wild may be only 2–3 cm. thick.

Detailed distribution in this country of *Cucumis Melo* var. *Dudaim* as a wild plant is not well known to me. I have received seeds, and grown the plants, from "Louisiana swamps," and have seen specimens from East Baton Rouge, West Baton Rouge, Evangeline, and Avoyelles parishes in that state; from Travis, Jefferson, Hidalgo counties in Texas; from Arizona without definite locality and ticketed *Apodanthera undulata*. Professor Clair A. Brown writes that the plant is widely distributed in Louisiana on the present alluvial soils, probably more abundant in sparsely settled areas.

Cogniaux in his monograph of Cucurbitacæ in 1881 accepts *Cucumis Melo* as definable in terms of two races, var. *agrestis*, Naudin, for the wild plant, var. *culta*, Kurz for the domesticated plant; under this treatment one may not label any specimen as *C. Melo* itself. The var. *culta* was held to include all the cultivated races, as Dudaim, without separate designation; this inclusive assemblage does not satisfy the requirements of either horticulturists or botanists who study the plants closely. In founding *C. Melo* Linnæus evidently had in mind only the cultivated progeny; var. *culta* then becomes a synonym of *C. Melo* rather than a separate category. The varieties separated by Naudin, preceding Cogniaux, as the result of his extensive cultures, remain our best presentation of the races of *C. Melo*. Whether the Louisiana-Arizona plant now under consideration is to be adopted as var. *Dudaim* or made a separate category is to be at last de-



164. DUDAIM, *Cucumis Melo* var. *Dudaim*. Spontaneous plant well established in Louisiana and Texas, collected also in Arizona, sometimes confused with Cucurbita. Items at bottom, the plant as seen in cultivation; two items at top, the wild plant, differing in size and vigor.

termined when its genesis and its genetic behavior shall have been worked out. At one time I included our Louisiana-Arizona plant in var. *agrestis*.

Another established Cucumis is *C. dipsaceus*, Ehrenb., Hedgehog or Teasel gourd; native in Arabia and Africa. This species appears to be truly wild and self-sustaining in the Rio Grande region of southern Texas, and in Baja California. In the southern part of the Baja peninsula I have seen it growing abundantly over bushes, perfectly at home, and the late Marcus E. Jones also found it in that territory. I have grown the plant at Ithaca from both the Rio Grande and Baja seed as well as from horticultural sources. The growing plant has much the look of *C. Melo* var. *Dudaim* but is more hirsute; the fruit is wholly different, however, being densely setose all over (as seen in picture on page 87 of The Garden of Gourds), a character that is prominent on the ovary as distinguished from var. *Dudaim* which has a softly pilose ovary.

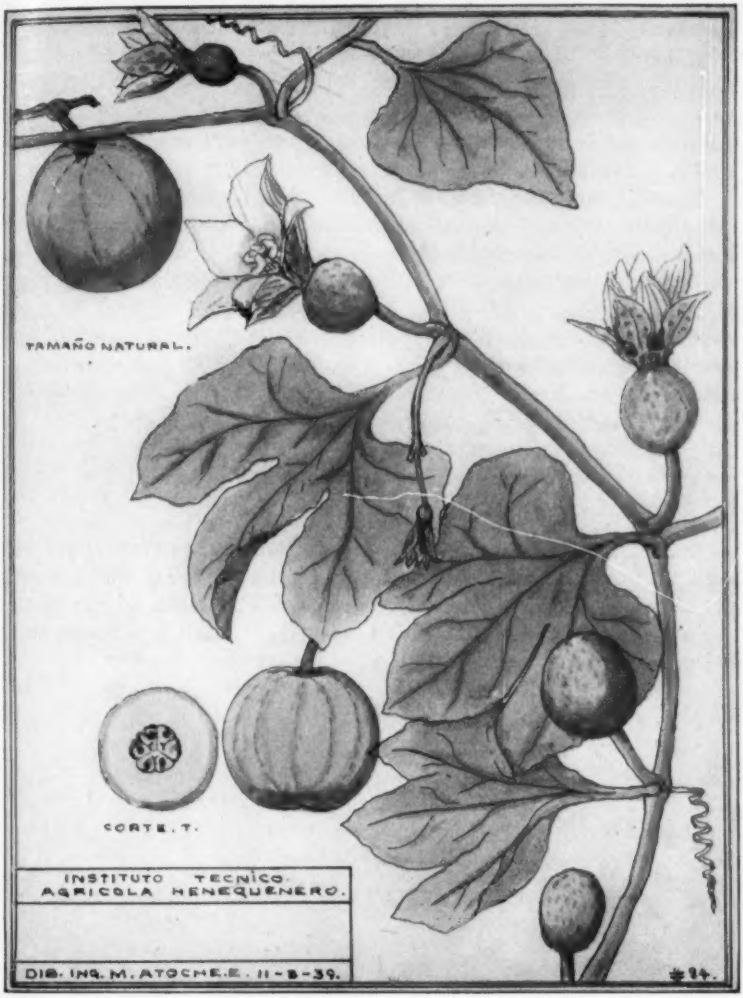
Still a third Cucumis may be mentioned. It is *C. Melo* var. *Chito*, Naudin, first named and figured as *Cucumis Chito* by Charles Morren in 1851 (La Belgique Horticole), from plants grown in Belgium from seeds sent from Havana. This plant differs from var. *Dudaim* in bearing obtusely and shallowly lobed leaves, and particularly in its oblong or ovoid fruit, only thinly pubescent at maturity, light cucumber-yellow, not odoriferous or striped. It is well known in cultivation as Mango melon, Vine peach and Lemon cucumber, employed in pickles and preserves. I have not definitely identified it as an established wild plant, but foliage specimens from Travis and Gonzales counties, Texas, strongly suggest it. The plant apparently has no native habitat.

CAYAPONIA

Recently I received from Yucatan an attractive painting of a plant supposed to be a Cucurbita. The painting is reproduced in Fig. 165, reduced in size. I also have specimens of the plant. It is the native *Cayaponia alata*, described more than sixty years ago by Cogniaux who had not seen pistillate flowers or fruit. The species has hitherto not been pictured. Cogniaux bestowed the specific name because of the alate petioles.

Cayaponia alata, Cogniaux, in DC. Monogr. Phan. iii, 746 (1881). Fig. 165.

Tendril-climber; stems striate or somewhat angled but nearly terete, puberulent to glabrous: tendrils simple, very slender, long-spiralled: leaves alternate, most of them deeply 3-lobed and the lateral lobes again angled or lobed, a few of the smaller leaves not lobed, cordate-ovate in outline, 8–15 cm. long, margins entire or slightly undulate with minute mucros at end of veinlets, upper surface papulose but hardly scabrid, under surface short-hirsute on veins; petiole strongly winged at apex and gradually narrowing to base: flowers solitary in axils, short-peduncled, not large but conspicuous because of the heavy dark veining on the yellowish-white



165. CAYAPONIA from Yucatan, confused sometimes with Cucurbita. Reproduction from a painting in color made in Yucatan natural size but here reduced to a little more than one-half full size. It is the plant known as *Cayaponia alata*, but the botany of the group requires further study.

corolla-lobes; staminates 3 cm. or more across at expansion; calyx-tube of staminate flowers short and broad, 16–25 mm. long, much exceeded by the foliaceous lobes that nearly or quite equal the hirsute corolla-lobes; stamens 3 with free filaments but the anthers coherent into a short column; pistillate flowers with ovary about 5 cm. long, calyx-lobes foliaceous, spotted, nearly equal to the striate corolla-lobes: pepo small, depressed-globose, 4–5 cm. thick, dull dark yellow, indistinctly if at all marbled, glabrous and glossy; seeds dull brown-black, 15 mm. long, 7–8 mm. broad, plump, not marginate.

There is confusing variation in the herbarium material representing this species of Cayaponia, and apparently new field studies are required. Under such circumstances the above diagnosis may later need modification.

Described originally from Hacienda Sara-Grossa; Standley in his Flora of Yucatan, 1930 (Publ. No. 279, Field Museum of Natural History) speaks of it as "frequent" and "a large coarse herbaceous vine." I have seen it also from Tuxpeña, Campeche. My material, like the picture, comes from Dr. Narciso Souza Novelo, Mérida, through the courtesy of my helpful correspondent, Maximino Martinez of Mexico City.

NOTE

Cucurbita cylindrata. After page 304 had been printed I received word that the type station Miraflores is not the village of that name in southern Baja California but is near a ranch about the middle of the peninsula. It is about twelve miles east of El Arco, at approximately latitude 28 degrees, and longitude a little more than 113 degrees.